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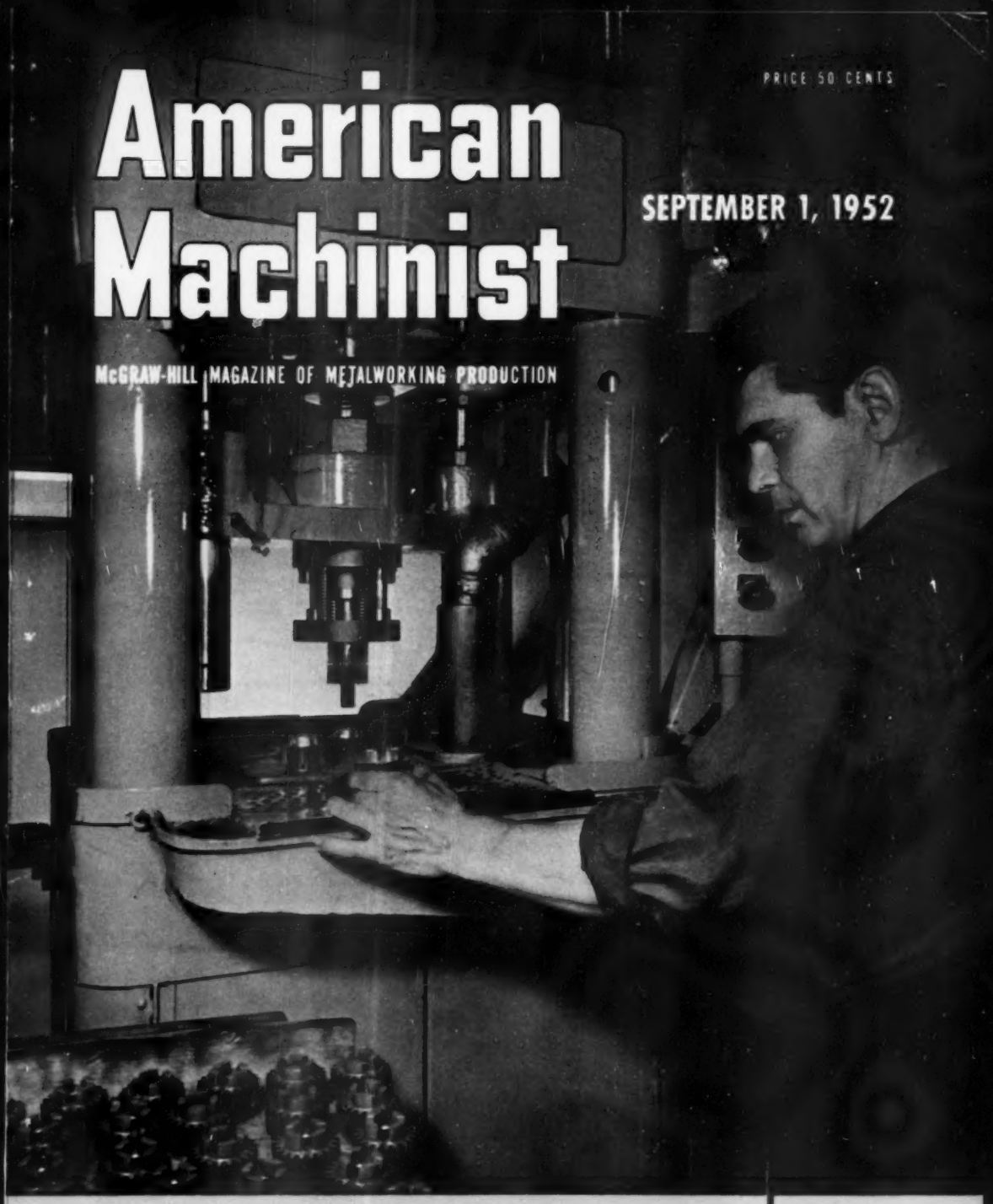
American Machinist

SEPTEMBER 1, 1952

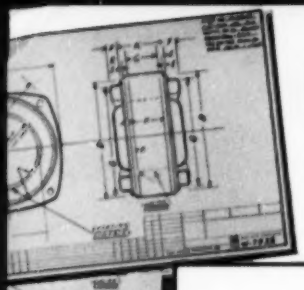
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Press-Tool Safety—A SPECIAL REPORT

Contour Grinding...Stretch Forming

500 powder-metal gears an hour—see page 2



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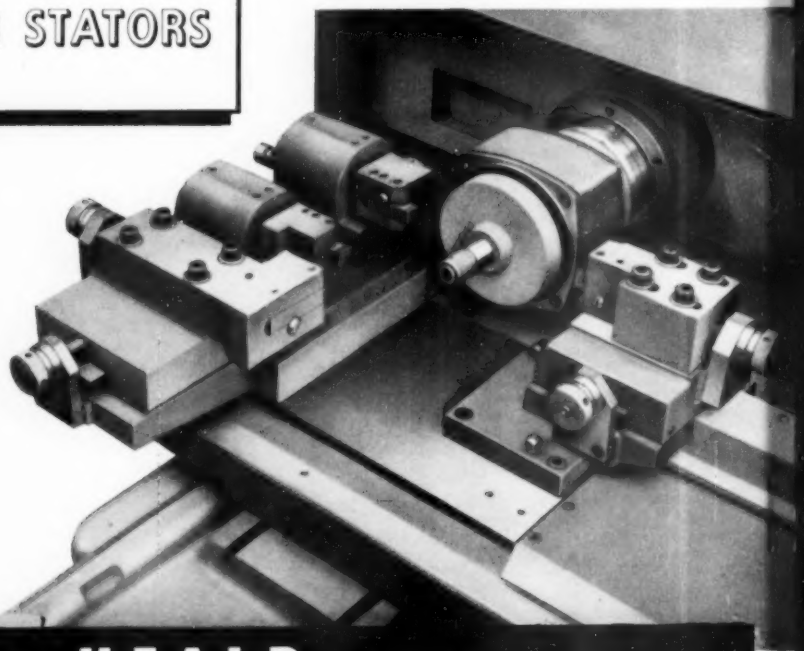

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CONTENTS for SEPTEMBER 1, 1952

VOL. 96, No. 18

ADMINISTRATION

Editorial ..... *Burnham Finney* 103
Wearing off the Green ..... *Round Table* 137

SPECIAL REPORT

Don't Overlook Safety in Press-Tool Design ..... *L A Faulkner* 121

ASSEMBLY

Wooden Soldering Clamps Set Up Corners ..... *C T Bower* 141
Spotwelding Spacing ..... *R G Vare* 142
Welding Fixture Body-Controlled ..... *D G Nolle* 144

CASTING & MOLDING

Ingenious Tools Make Metal-Powder Parts ..... *George H DeGroat* 105

ENGINEERING

Chrome-Glass Coating on Molybdenum for Jet Engine Parts 109
How to Select a Cutting Fluid ..... *Thomas Badger* 118
Belt Grinding Tapers Wing Skins ..... *J R Burns* 154

INSPECTION

Sonic Tester Checks Honeycomb Panels ..... *H O Williams* 116

MATERIAL CUTTING, FORMING

New Stretch-Forming Techniques ..... *Frank Charity* 113
Symbols for Press Tools ..... *Federico Strasser* 135
Six Language Press Dictionary ..... *Federico Strasser* 136
Pair Forging Makes Giant Rotor Disks 138
Reinforced Punch Walls ..... *F C Elmo* 140
Jack-screw Die-Lifter ..... *M M McKenzie* 142
Bed Dimensions for OBI Presses ..... *(RBS)* 151

SAFETY

Safe Handling of Magnesium I, II ..... *(RBS)* 147

TOOLING

Gundrills Are Home Grown at Allison ..... *Frank G Senter* 110
Diemakers' Kinks ..... *Federico Strasser* 115
Simple Mechanism Increases Gear-Shaper Capacity ..... *O F Lambert* 140
Lever Clamp Eliminates Half-Turn Screw ..... *R Mery* 140
Oil Pan Controls Fluid Quantity ..... *Fred Lettino* 140
Simple Angle-Dresser ..... *G F Burnley* 141
Inverted Countersink ..... *A Vetsch* 141
Four Jaws Work Fast as Three ..... *R W Morrison* 142
Drill Chuck Drives Taps ..... *Oscar F Lambert* 142
Shaving Cutter Slices Brass to Width ..... *R J Dodson* 143
Guide for Dressing ..... *G F Burnley* 143
Toolbits Scribe for Height Gage ..... *K J Carson* 142
Antifriction Steady-rest Jaws ..... *Dale Orr* 143
Carbide Stops Swing-stop Wear ..... *Otto V Howe* 143
Bandsaw Slotting Fixture ..... *T H Hsu* 143
Pierce and Draw in Simple Die ..... *T H Hsu* 144

NEWS OF METALWORKING

Spot News 89
Washington 91
Detroit 93
Machine Tools 95
Gaging Metalworking 99
Gaging Business 100

DEPARTMENTS

Backlash 80
Tips for Top Shop Men 114
Reference Book Sheets 147
Talking Shop 153
Subcontracting News 160
Equipment, Materials, Parts 162
Round Table Discussion 184
New Books 214

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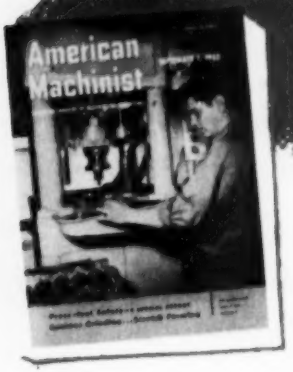


Chips and QUIPS

Agitator Gear . . . Tools for powder metallurgy are frequently carefully guarded secrets—the business is still in the stage in which "secret processes" are rampant. But John Haller, vice president of Michigan Powdered Metal Products Co, Inc, consented to let us show how several of his company's newest tools were made. That's our lead article, complete with drawings. And one of the jobs, an agitator-shaft gear, is the subject of our cover picture. This is a difficult part, because of the combination of teeth and lugs, but the tooling pictured there and described in the article knocks out briquettes at 500 an hour. That takes a bit of doing, as you'll see. . . . There's a special sizing machine and other sizing setups in the article too.

Gun Drills . . . Since our series of articles and Special Report on gun drills, there has been increasing interest in this rebirth tool. To add to the information, Frank Senter, special machine builder for Allison Div of GM at Indianapolis, describes methods and tools developed by Allison to make gun drills when that company's source of supply was cut off.

Sonics . . . Sonic testing has always interested us, although available examples are few. We remember, for example, the fiddler who tested a series of rotors to destruction before high-speed tachometers were available. He put a minute projection on each rotor, so a sound was generated of a cyclage exactly that of the rotative speed. Then, as the rotor "wound up," he followed the note on his violin. When the rotor exploded, he took that note—which he knew to be of so many thousand cycles—and had his bursting rpm. Of course, with some modern speeds, you'd need a dog to hear the note, but electronic tachometers are now available. . . . Anyhow, our current story is on sonic testing of welded honeycomb structures at the Santa Monica plant of Douglas. Sand particles and sonic vibration outline unbonded areas.

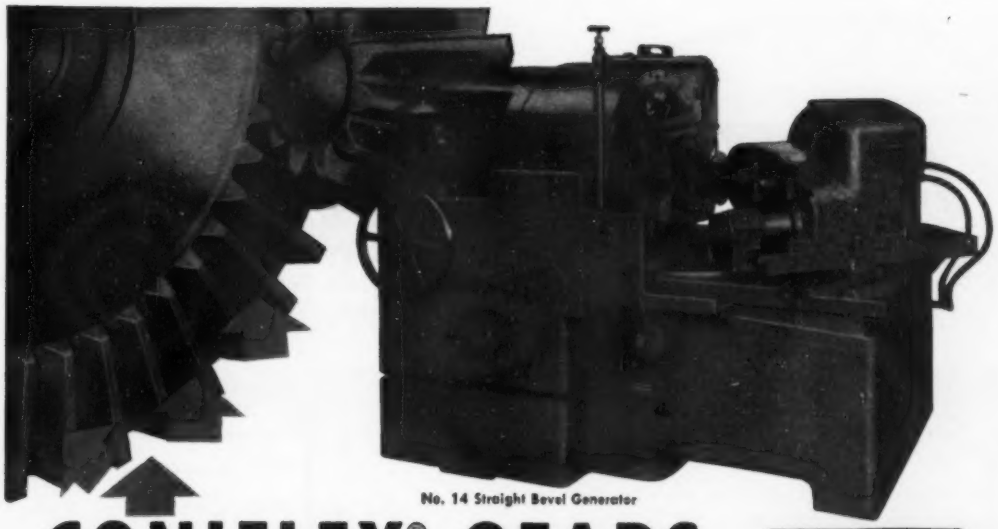
Stretch . . . North American has been doing some new and different work with stretch forming. In this issue is a roundup of these developments, including a new type of curved jaw that saves material.

Press-TOOL Safety . . . Much has been written about press safety, very little on press-*tool* safety. L A Faulkner, supervisor of industrial-plant service for Liberty Mutual Insurance Co, talks about press-tool safety in our current 14-page Special Report. According to accident experience, 20% of accidents occur in primary operations (blanking, piercing, etc) and 80% on secondary ones (forming, redrawing, coining, etc). Guarding alone is not the answer; the die designer must provide tool features that avoid any necessity for the operator to feed strips too close to the punch, or to use in under-the-punch feeding of second-operation parts, or to reach in to remove parts and scrap. Strippers, feeds, magazines and clutch controls are all important.

Bigger . . . A spread of pictures herewith shows how Bethlehem Steel made some tremendous disks for a new wind tunnel. The disk forgings, among other things, were bigger than doors, furnaces and presses. See the pictures to find out how the job was done.

Coming . . . *Sept 15* AM *has a die story to end all die stories, which is also our Special Report. It's 24 pages, describing unusual and clever setups at the Parts Div of Sylvania, the result of a selective tour with photog. There are progressive dies for press and multi-slide, tooling for plastics, wire drawing, sheet carbonizing, and a host of other shop operations, all to very close tolerances. Objects of much of the work are those little metal parts that go in a radio tube, and make such wonderful—and terrifying—noises come out. The tooling is really something. . . . There are also articles on die standardization, aircraft shop shots, and the start of a 2-article series on contour grinding.*

Tool Trouble-shooter . . . Seven years after he started as an apprentice with Wood Turret Machine Co back in 1910, Frank Senter was works manager of the plant. When Wood sold out to Warner & Swasey in 1925, Frank moved over to the R D Eaglesfield Machine Co, Brazil, Ind, for a couple of years, then joined Lanchester Iron Works, New London, Ohio, to work on development of special brick-handling machinery. Early in 1940 he joined Allison as special machine builder—and has been tackling the "impossible" jobs ever since. When not trying to solve the special jobs, Frank spends a lot of time with his camera—and like many another "shutterbug," he has recently become interested in strobe lighting for action shots. He wrote our current article on gun drills.



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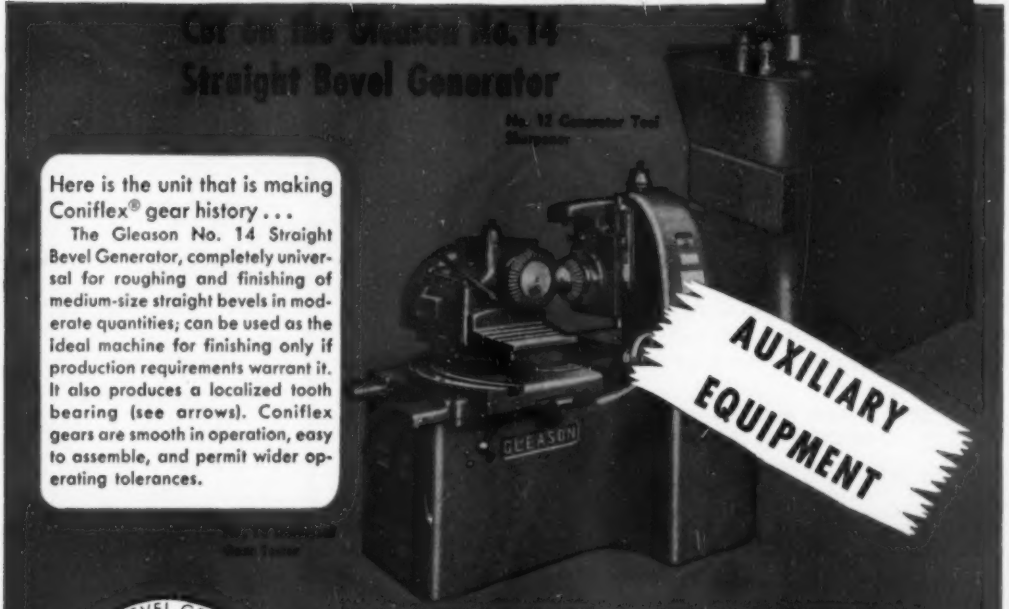

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8	Chip Formation, Surface Finish, and Cutting Fluids
9	Power Required in Milling
10	Mounting of Milling Cutters
11	The Milling Machine in Toolroom Work
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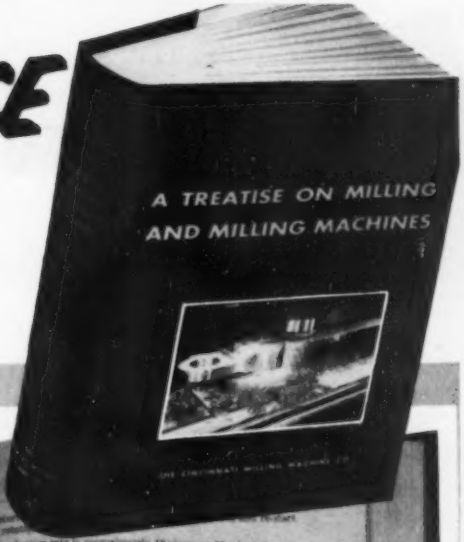

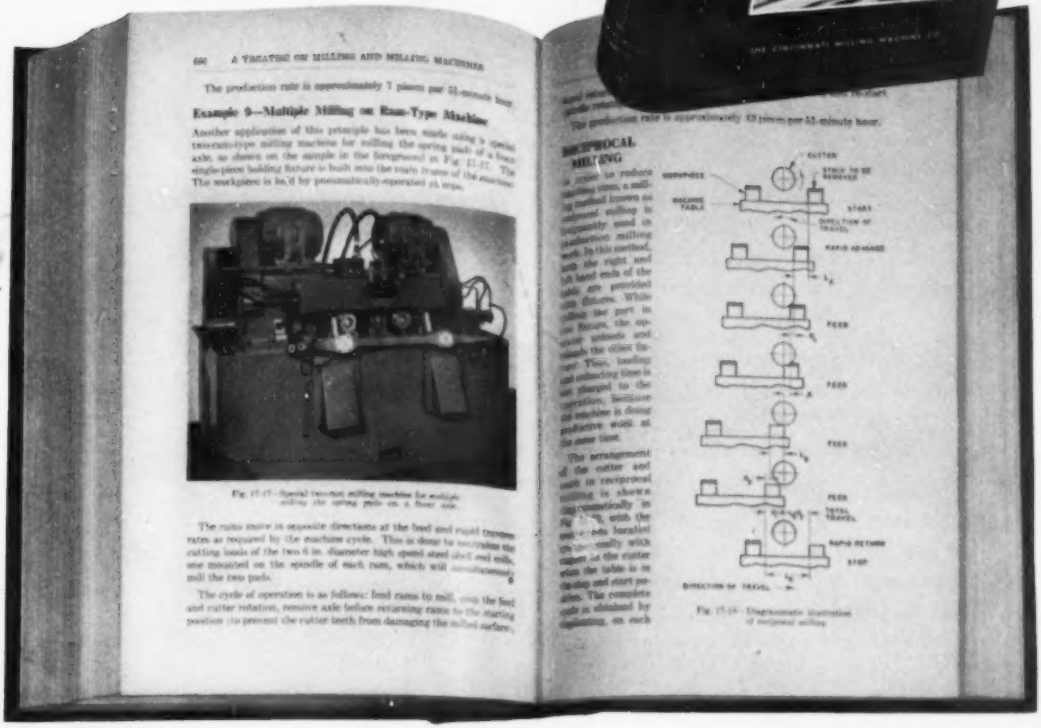

696 A TREATISE ON MILLING AND MILLING MACHINES

The production rate is approximately 7 pieces per 55-minute hour.

Example 9—Multiple Milling on Ram-Type Machine

Another application of this principle has been made using a special two-ram-type milling machine for milling the spring pads of a front axle, as shown on the sample in the foreground in Fig. 17-17. The single-piece holding fixture is built into the main frame of the machine. The workpiece is held by pneumatically-operated clamps.

Fig. 17-17—Special two-ram milling machine for multiple milling the spring pads on a front axle.

The rams move in opposite directions at the feed and rapid traverse rates as required by the machine cycle. This is done to neutralize the cutting loads of the two 6 in. diameter high speed steel shell end mills, one mounted on the spindle of each ram, which will simultaneously mill the two pads.

The cycle of operation is as follows: feed rams to mill, stop the feed and cutter rotation, remove axle before returning rams to the starting position to prevent the cutter teeth from damaging the milled surfaces.

The production rate is approximately 13 pieces per 55-minute hour.

RECIPROCAL MILLING

Fig. 17-18—Diagrammatic illustration of reciprocal milling.

NATI

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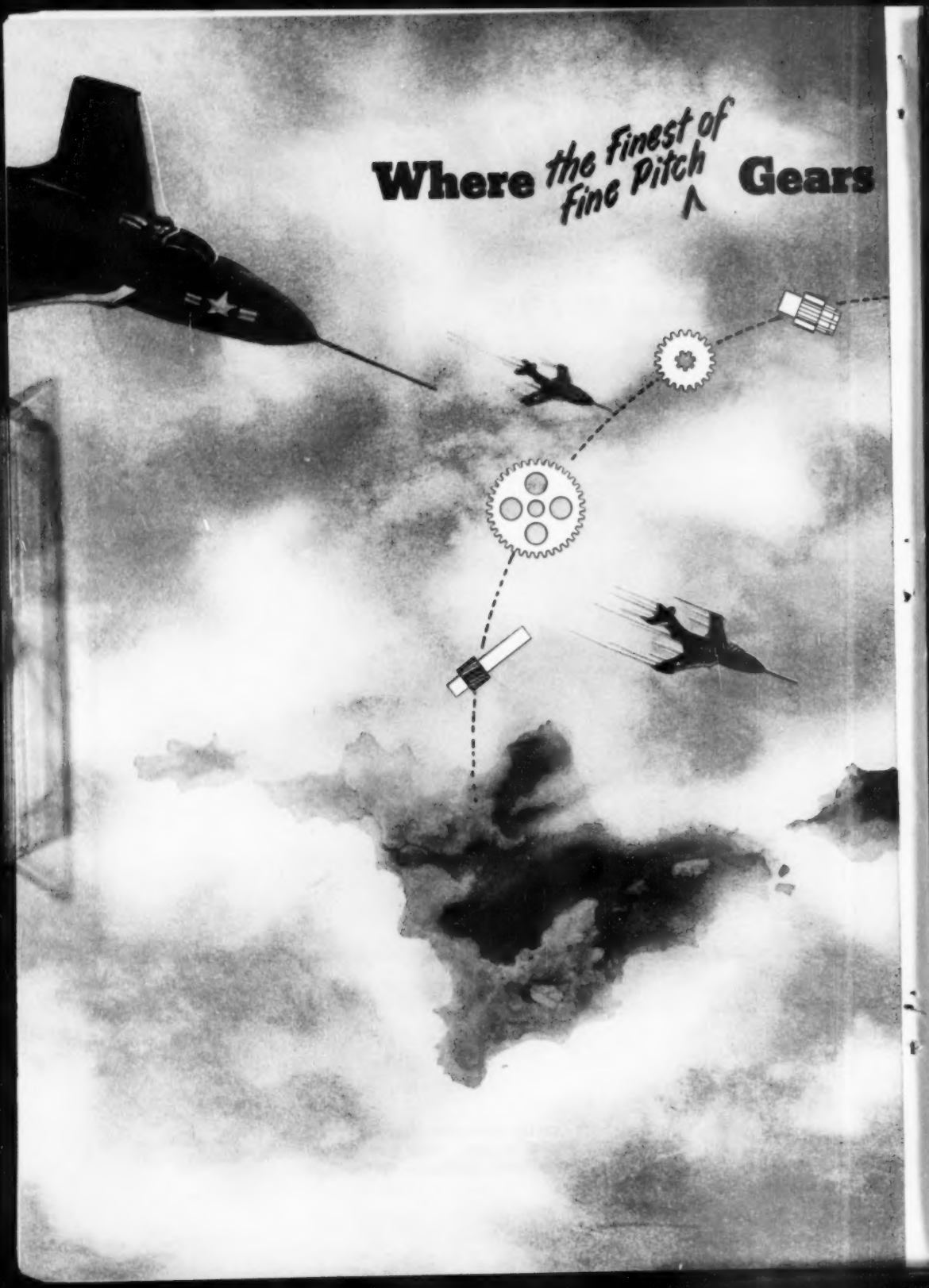
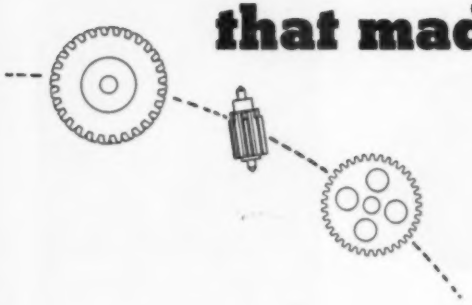

Where the Finest of Fine Pitch Gears

justify the Machine-Skill that made them



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The Fellows 3-inch Gear Shapers and Fellows Shaving Machines, on which the great majority of such gears are made, are standard machines—maintained in fine adjustment by men of industry, men whose production-shop skill is unmatched anywhere else in the world.

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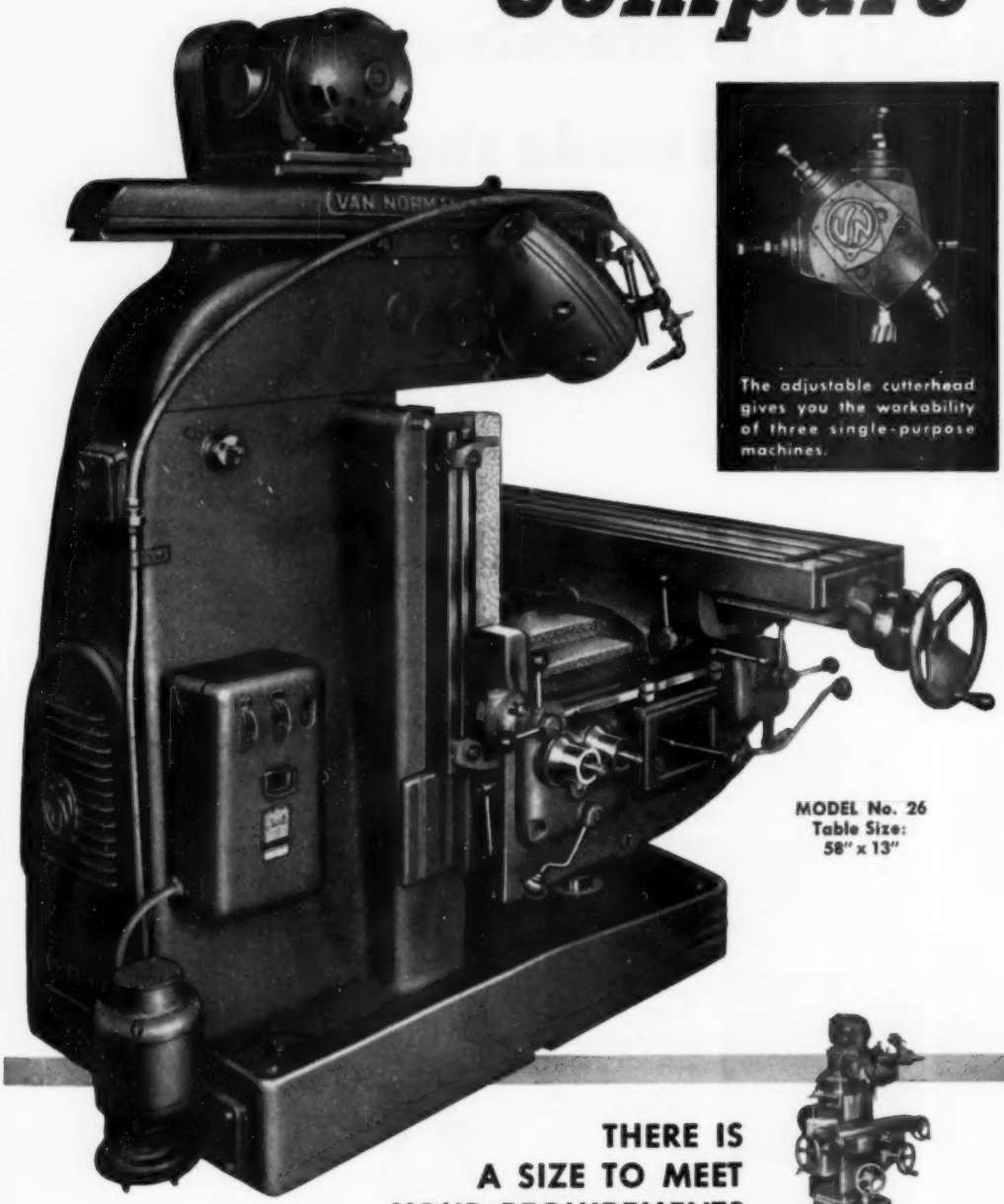

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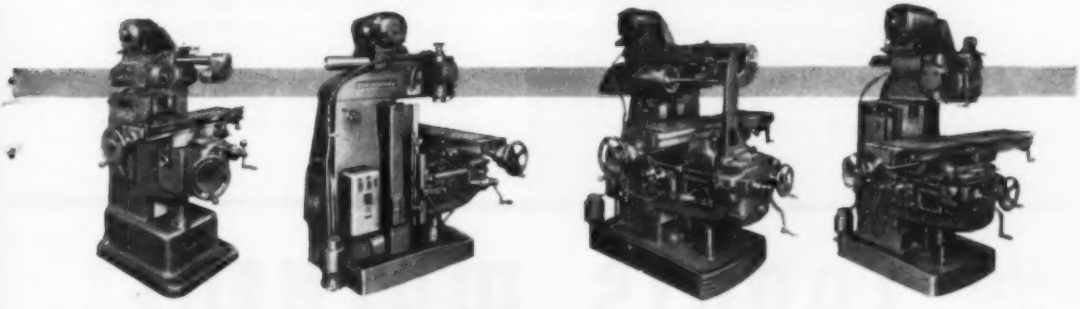

No. 16 — Table: 37" x 9½" **No. 22-L** — Table: 45" x 10" **No. 36** — Table: 64" x 14" **No. 38** — Table: 64" x 14"

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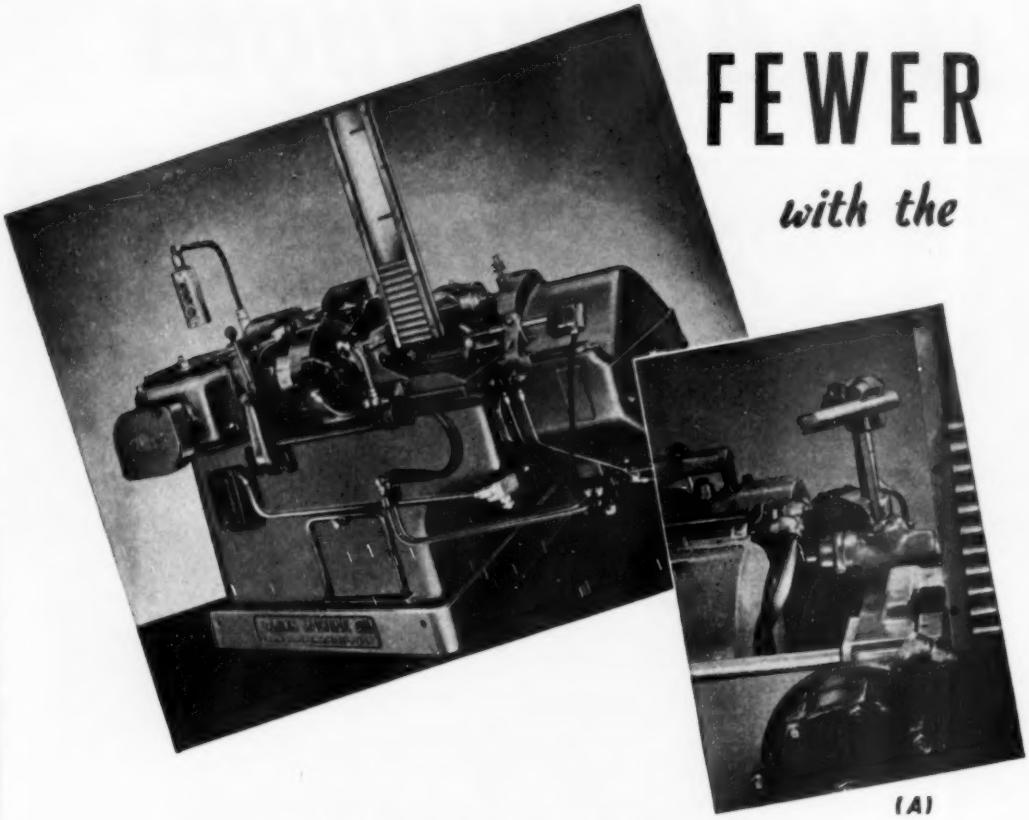

(A)

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The operation cycle of the Landis Automatic Nipple Machine is completely automatic. During operation, the operator is only required to give the machine visual attention and keep the magazine on the left-hand carriage filled with nipple blanks.

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After the thread has been cut, and the reaming and chamfering operations simultaneously completed on one end of the nipple blank, the die head and vise open automatically and the carriage returns to loading position. The semi-finished nipple is left in position on the work-rest bar for transfer to the right-hand carriage. Mechanical fingers pick up the semi-finished

LANDIS MACHINE

WORK STOPPAGES—

Improved LANDIS *Automatic Nipple Machine*

CONTINUOUS PRODUCTION

nipple (*A*), turn it end-for-end (*B* & *C*), and place it in position on the work-rest bar of the right-hand carriage (*D*). The semi-finished nipple is pushed into position and gripped for the threading, reaming, and chamfering operations on the unfinished end (*E*). After completion of the second operation, the finished nipple is automatically ejected. Simultaneous with the operations on the right-hand carriage, a second blank is beginning the operation cycle on the left-hand carriage. For further information, write for Insert to Bulletin No. D-84.

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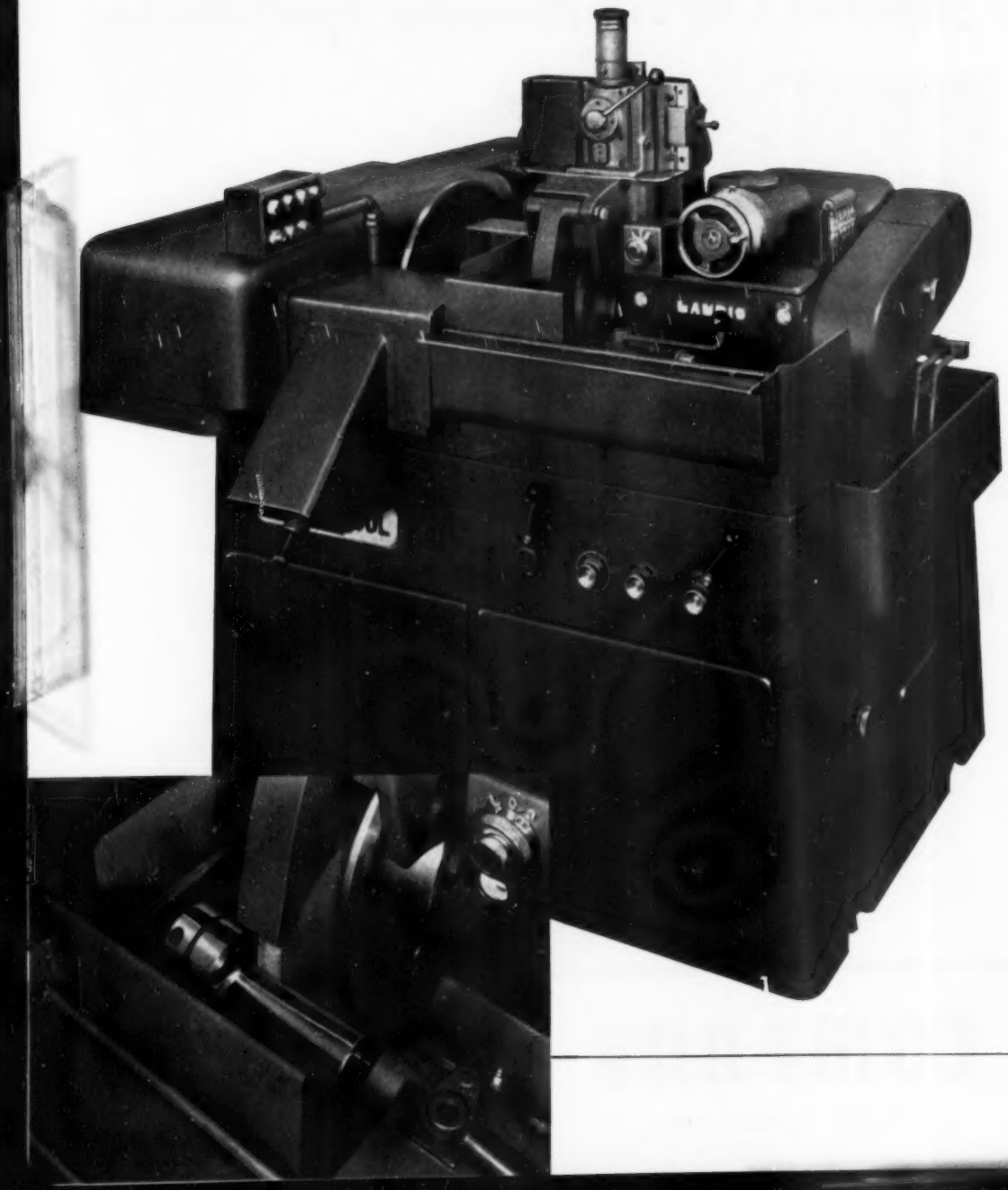
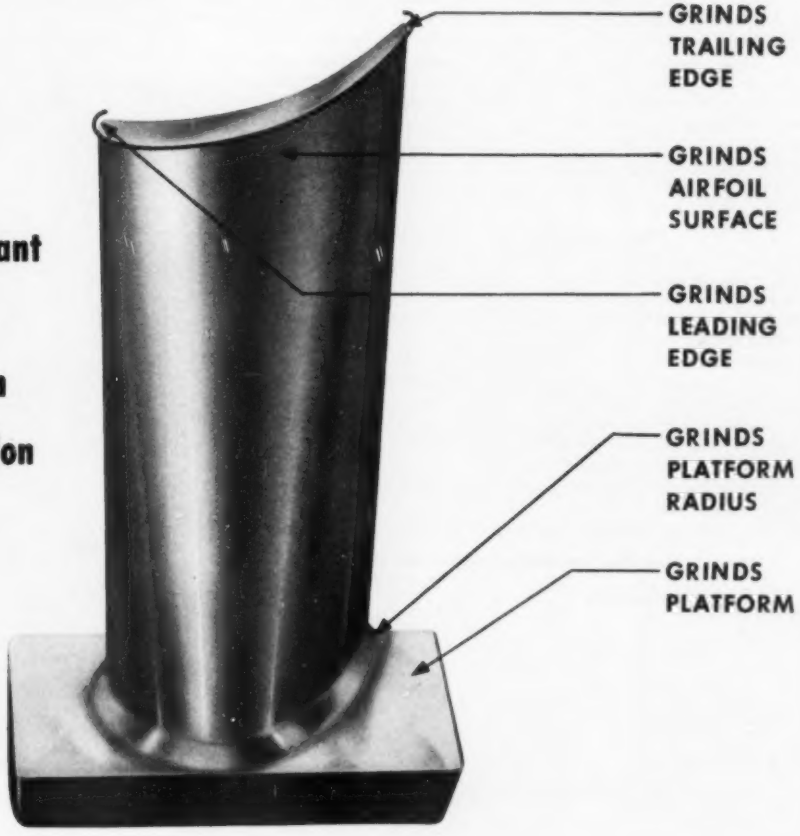
NEW LANDIS



jet blade contour grinder

Grinds from forging to finished blade

5 important surfaces ground in 1 operation



This is the fastest known method for grinding blades, buckets, vanes and nozzles now being used in jet engines. You can grind pieces with twisted, warped or broken-back contours; straight contours; parallel or non-parallel sides.

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precision grinders

36 speeds-18 feeds

Delivery may be better than you think on these highly versatile G&L floor-type horizontal boring, drilling and milling machines

FOR fast expansion of your production facilities, G&L Series 30 floor-type or openside machines may be scheduled for earlier delivery than you might think. They'll give outstanding versatility and accuracy to .001" on both extra-large specialized operations as well as for long-run standard production work.

G&L Series 30 models may be used either on top or alongside a floor plate, and also in conjunction with either power, or hand revolving and tilting tables. An end support mounted on its own runway provides outboard support and bearing for boring bars when required.

The floor-type machines can be made with greater work range than any other horizontal boring machine. Machine runways can be made in any length, and floor plates built up of standard sections so that one or several of them may be used to support large jobs.

Check this excellent work range

Both Series 30 models — the 350-F (5" dia. main spindle), and the 360-F (6" dia. main spindle) — also offer a high-speed auxiliary spindle. For boring and heavy milling operations you use the main spindle at speeds up to 500 rpm. Then, for high-speed drilling, tapping and light milling, the very sensitive high-speed spindle — easily reversed at speeds to 2000 rpm — is used. Twenty horsepower allows full utilization of modern, carbide cutting tools.

Another factor contributing to the extreme flexibility of these units is the ability of their column and headstock to operate either independently or simultaneously. Each operation is controlled by a single lever. With this arrangement, the operator can follow an irregular outline on die work, pads, flanges, etc.

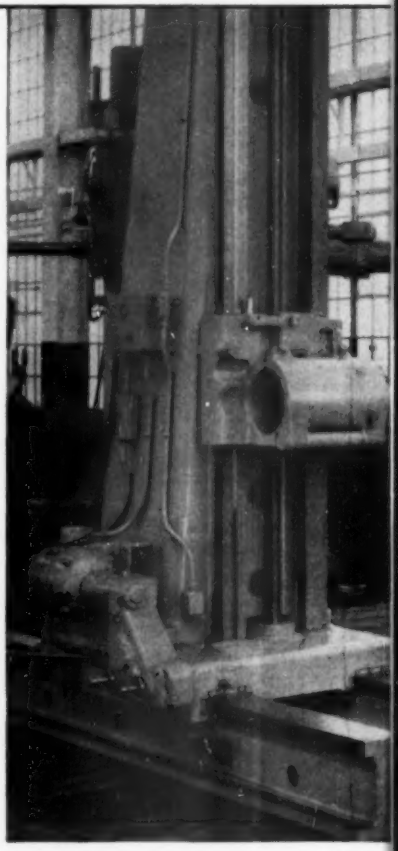
Other features include: centralized controls . . . a telescopic vernier sight . . . safety devices for all traversing units . . . extra rigidity at extreme limits of machine and headstock travel.

Write for complete details and delivery information today!

Simplified Specifications—350-F and 360-F

	Main Spindle 350-F	Main Spindle 360-F	High Speed Spindle 350-F	High Speed Spindle 360-F
SPINDLE DATA				
Diameter of spindle	5"	6"	2"	
Longitudinal travel	36"	48"	9"	
Range of speeds (in rpm) (36)	8.5 to 500		34 to 2000	
Range of feeds (per revolution of spindle) (18)	.005" to .250"		.001" to .062"	
Maximum distance top of runway to spindle centers	87"		95¾"	
MACHINE DATA				
Range of feeds to headstock and column movements (18)	.5" to 25"/min.			
Rapid traverse headstock and column	120"/min.			
Vertical travel headstock on column	72"			
Horizontal travel column on runway	72"			
Height of runway	14"			
1800 rpm constant speed motor	20 hp			
Approximate weight of standard machine	350-F 44,000 lb.—360-F 46,000 lb.			
LARGE CAPACITY MACHINES (optional work ranges)				
Columns	84", 96", 120"			
Runways	Furnished in any length in 2' increments			

Over size floor plates made up in 5 foot wide sections, in lengths of 120", 144", 168", 192", 216".



Photos (upper, and lower left) show a G&L 360-F working on crawler-shovel base.

GIDDINGS & LEWIS

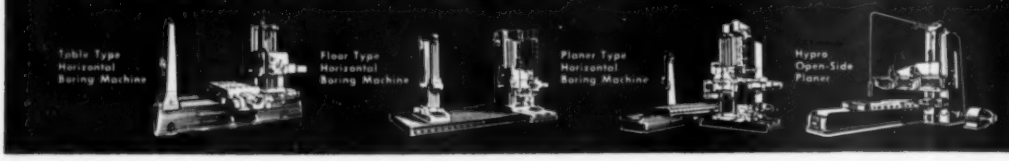
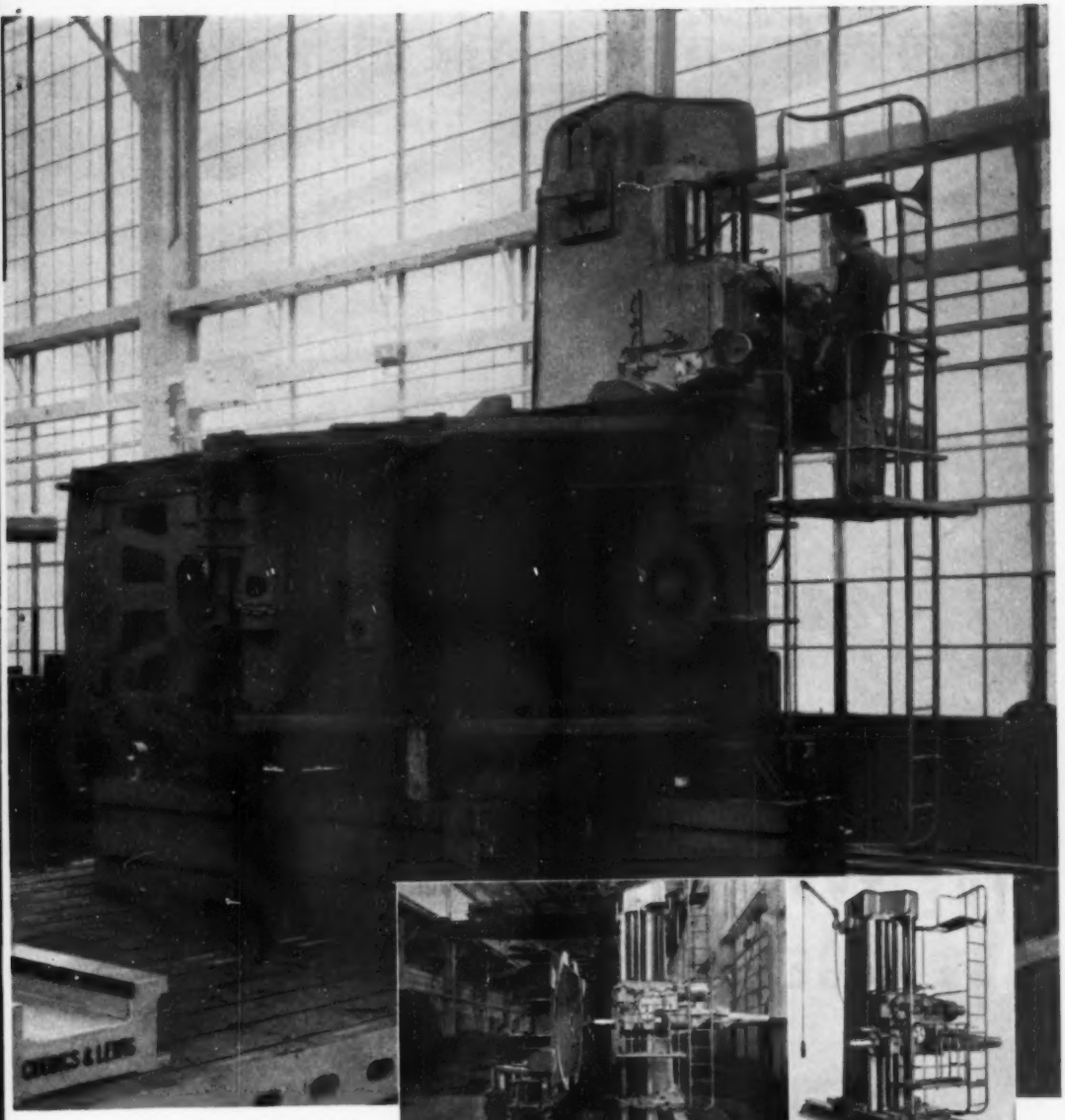
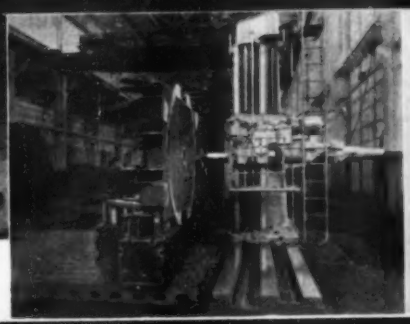


Table Type Horizontal Boring Machine
Floor Type Horizontal Boring Machine
Planer Type Horizontal Boring Machine
Hypro Open-Side Planer





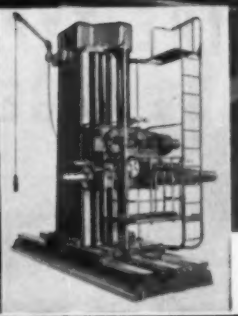
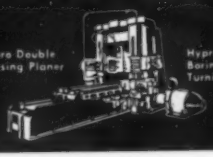


Photo (far right) shows G&L 350-F with pendant control.

MACHINE TOOL CO.

Hypro Planer Type Milling Machine


Hypro Double Housing Planer

Hypro Vertical Boring and Turning Mill

G&L HYPRO

FOND DU LAC
WISCONSIN

Van Keuren

ORIGINATORS of WIRE TYPE PLUG GAGES

WRITE for the 1952 Van Keuren Catalog and Handbook No. 35. It contains specifications and prices on wire type plug gages and also Taper Insert Plug Gages up to 2.500" diameter.

Specify VAN KEUREN Wire Type Plug Gages on your drawings for all sizes from .010" to .500" diameter. Taper Insert Plug Gages in this range are a waste of time and money.

RECOMMENDED MATERIALS

High Speed Steel
Stocked in sizes from .010 to .050". Available at no extra cost.

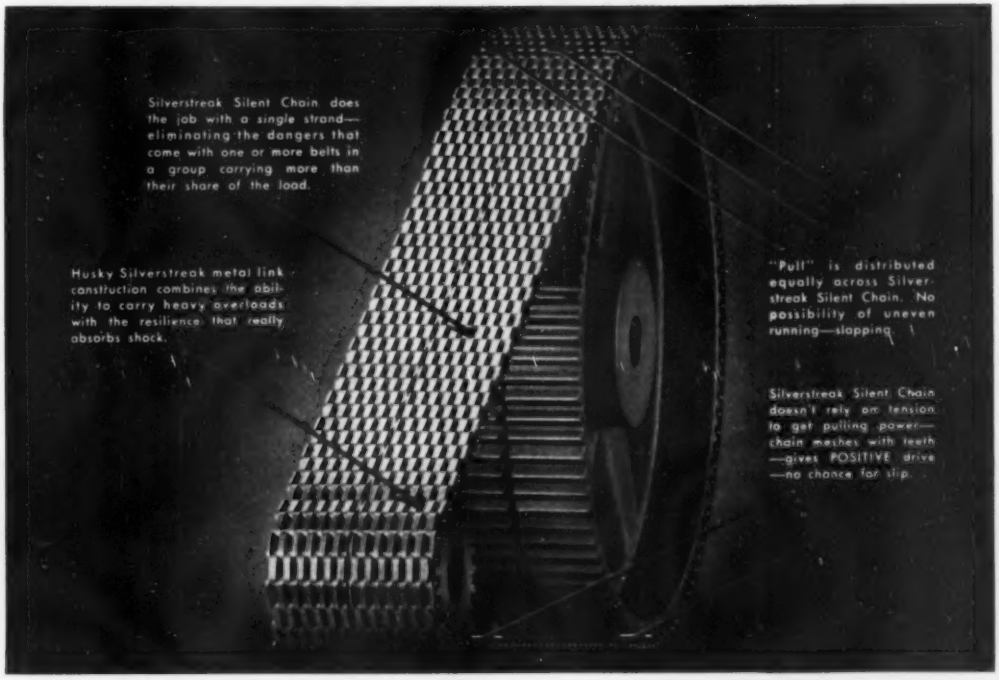
Chromium Alloy Tool Steel
Standard for sizes .051 to 1.000".

Hard Chromium Plate
5 times the life of steel at 50% additional cost. Available in sizes from .016 to1.000".

VK Carboloy
50 times the life at 5 times the cost of steel. Recommended for close tolerance work and long runs. Available in sizes from .016 to .500" dia.

THE Van Keuren CO.,
173 WALTHAM STREET, WATERTOWN, MASS.
33rd YEAR
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

Here's the proved way to transmit high hp at high speeds...


Silverstreak Silent Chain does the job with a single strand—eliminating the dangers that come with one or more belts in a group carrying more than their share of the load.
Husky Silverstreak metal link construction combines the ability to carry heavy overloads with the resilience that really absorbs shock.
"Pull" is distributed equally across Silverstreak Silent Chain. No possibility of uneven running—slapping.
Silverstreak Silent Chain doesn't rely on tension to get pulling power—chain meshes with teeth—gives POSITIVE drive—no chance for slip.

Link-Belt Silverstreak Silent Chain drives are slip-proof...slap-proof...shock-proof

ON thousands of applications . . . under all types of operating conditions—Link-Belt Silverstreak Silent Chain Drives have proved their effectiveness and durability. High horsepowers and high speeds are delivered with the same trouble-free efficiency (over 98 per cent) as on less demanding loads. There's a power-transmission engineer in the Link-Belt office near you.

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

97.070

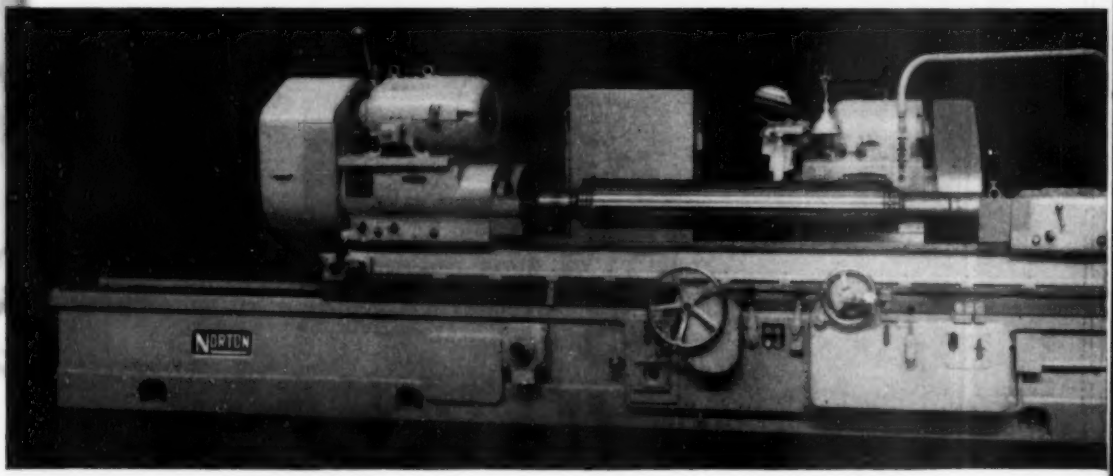
LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities.

As it has since 1940, a touch of the control button brings exact press speeds at the New York Herald Tribune. In those 12 years, there has been no replacement required on the two 100 hp Silverstreak Silent Chain Drives that power this press at chain speeds up to 3664 fpm.

New machine speeds cylindrical grinding 4 ways

Faster cutting
Quicker set-up
Easier operation
Less down-time

Norton's new C-2 grinder gets out heavy work



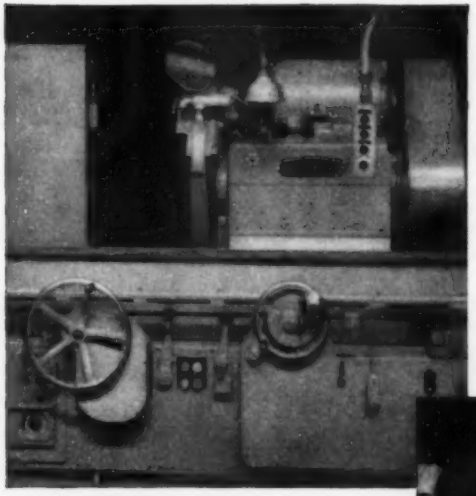
This new grinding machine gets out more heavy production because it works more of the time. When used as a semiautomatic all the operator does is set up the machine and push the button. Machine automatically grinds to size and finish. Operator then unloads. As simple as that!

This is just the kind of grinding machine you expect from Norton — one that's fine from every angle: rate of production, accuracy of work, convenience and ease of operation.

Whether this C-2 machine or another is the type you need, your Norton representative will be glad to talk with you at the planning level. Norton leadership in both grinding wheels and machines is your assurance of satisfactory operation. Only Norton has for a long period of years been making wheels and machines.

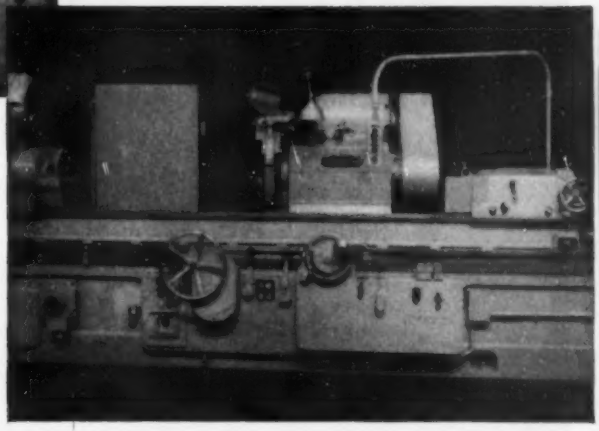
Norton welcomes opportunities to help you solve your grinding problems. Our objective is the same as your own — more production at lower costs. For more information see your Norton representative or write us direct.

NORTON COMPANY, Machine Division, Worcester 6, Mass.



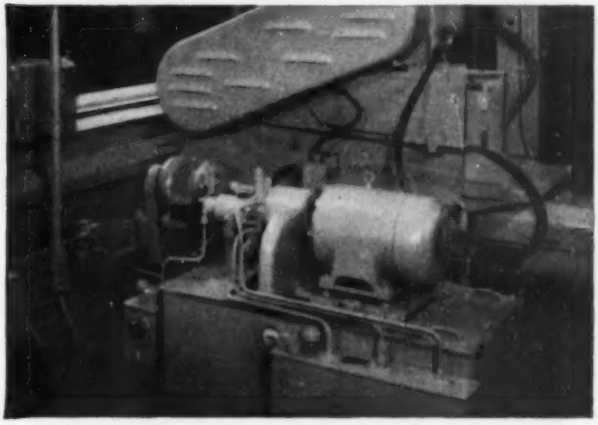
Easy to operate because all the controls are on the front of the machine. The operator doesn't have to reach for anything! A graduated feed readily indicates the amount of feed. A "click-count" mechanism signals for each .0001" reduction in work diameter. Table truing and grinding speeds may be pre-set and either one obtained by selector lever. Continual resetting is avoided.

with ease



Norton C-2 Cylindrical Grinding Machine. Semiautomatic or Plain in 18", 24" or 30" swing — and in work lengths from 48" to 168". Suitable to such work as railroad car axles, diesel crankshafts, rolls and gun barrels. In addition to fast grinding action, it reduces costs by simplified set-up operation and maintenance.

Easy to set up, too. Grouping of controls at the front of the machine means minimum time for setting up. Quick change-over from job to job. The wheel feed hand wheel is graduated to indicate amount of feed as the wheel rotates past a fixed pointer.



And easy to maintain. All maintenance points are on the outside of the machine. Pumps, motors, filters, lubrication flow control valves, and all reservoirs are readily accessible. Electrical controls are grouped for easy inspection and enclosed for protection.

To Economize, Modernize With **NEW**

NORTON

GRINDERS and LAPPERS

Making better products
to make other products better

District Sales Offices:
Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

facts tell the story { NEW KEARNEY & TRECKER MILWAUKEE CK USER BIG

THE FACTS ON THIS JOB ARE:

Machine: New 25hp No. 5, Model CK Plain.
Material: Cast Steel, 150 Brinell.
Feed: 4½ inches per minute.
Cutter Speed: 100 surface feet per minute.
Rate of metal removal: 17.5 cu. in. per min.
Production rate: 4 parts per hour.

NOTE: Each part requires but a *single pass* of the cutters on the new Kearney & Trecker CK machine.

Old production rate: 1⅓ parts per hour—two passes required per piece.

MILLING MACHINE PAYS PRODUCTION DIVIDEND

NEW 25HP CK PLAIN MACHINE OUT PRODUCES PREVIOUS MACHINE NEARLY 4 TO 1!

CK MILLING MACHINE FEATURES THAT HELPED DO THIS JOB BETTER

Greater rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.

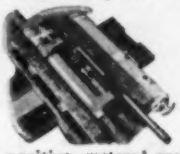
New CK machines have Greater Horsepower. On this job, 25hp enabled operator to get maximum production from his cutters.

No. 60 heavy-duty drive flange around spindle nose permitted use of an extra-rigid heavy-duty arbor on this multiple cutter setup.

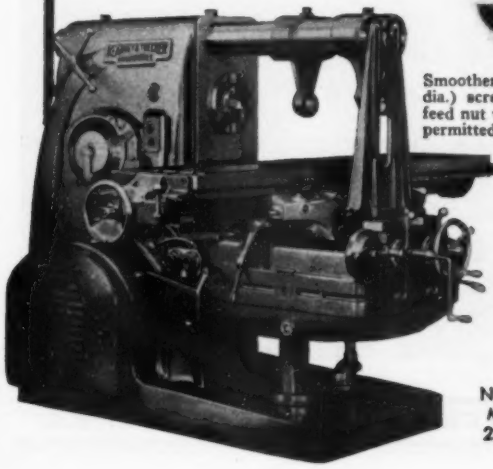
CK's 3-bearing spindle and flywheel assure Maximum Cutter Efficiency. On this job it meant fast metal removal and smooth finish in a single pass.

The new Kearney & Trecker CK milling machine doing this job has 24 different spindle speeds (13 to 1300 rpm.) Its 32 different table feeds range from 3/4" to 90" per minute. Thus operator was able to *pick exact speed and feed* to get fullest advantage from high horsepower and modern cutting tools. This meant Greater Productivity on this job.

Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut with backlash eliminator permitted heavy cut.



CK's positive, metered pressure and automatic lubrication assured cool, wear-free operation in spite of heavy cutting load.

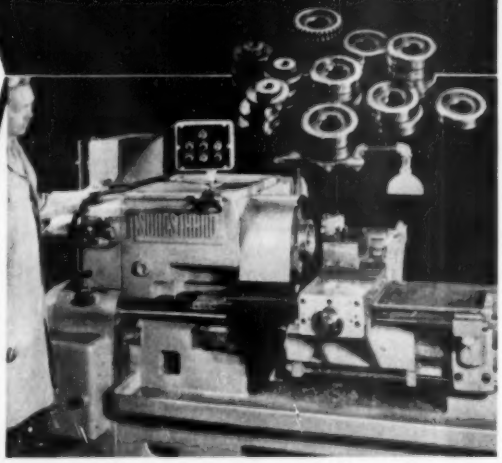


New No. 4 Model CK 25hp Plain

Investigate the new CK line of milling machines. You'll find every feature is test and job-proven to give you cost-cutting results . . . greater machine capacity, productivity and better finished products. Contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

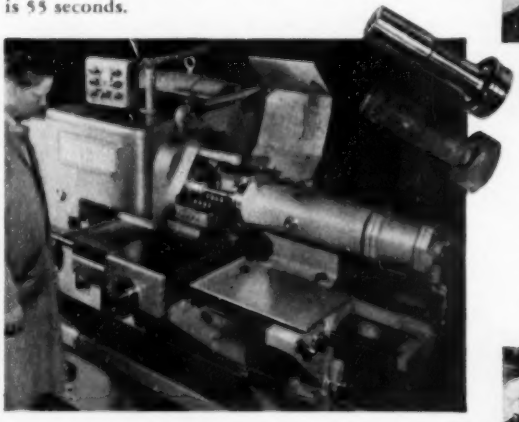
You'll Get Better Production With Sundstrand Automatic Lathes

...ON JOBS LIKE THESE



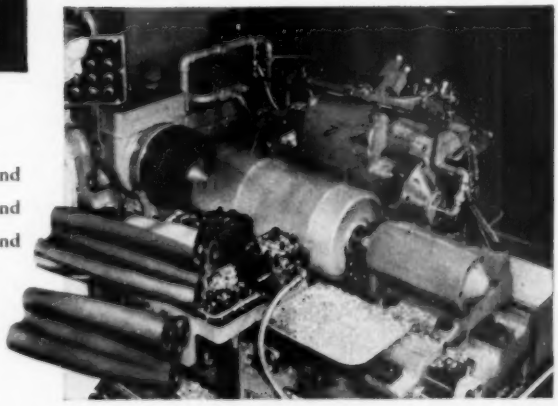
1 Small Lot Turning

This Model 8A Automatic Lathe machines a number of different sizes of bronze worm wheels and steel hubs in small lot sizes. Two operations are performed on each part. These include turning, facing, and boring. Floor to floor time of the largest worm wheel is 55 seconds.



2 Long Run Turning

Here is a 50 hp Model 12A with tooling set-up for production turning, facing, and chamfering of a shaft part. Multiple tools for faster stock removal and automatic cycling for fast easy operation has increased production of this part to 200 per hour—70% better than former methods.



3 Special Turning

Application of a special two position double end cross feeding facing slide, special front slide, and tail stock locator makes it possible for this Sunstrand Automatic Lathe to rough and finish turn and rough and finish face both ends of aluminum blower rotors in one chucking of part.

SUNDSTRAND

RIGIDMILLS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

SOME OF THE DESIGN FEATURES THAT MAKE THIS PRODUCTION POSSIBLE

These are only 3 of the 8000 or more users of Sundstrand Automatic Lathes. These users have always found Sundstrands a profitable investment and many have changed from old to new Sundstrand Automatic Lathes in order to get even higher productivity as a result of design improvements. The following features incorporated in the design of the latest models of Sundstrand Automatic Lathes will help you increase production.

• Greater Horsepower

All new Sundstrand Automatic Lathes have been redesigned for greater rigidity and larger spindle drive motors. They have ample power for use of carbide cutting tools and are capable of doing more work.

• Wider Speed Range

Spindle speed range ratios have been increased to 30 to 1 to obtain maximum in cuning efficiency over a wider range of sizes of parts and material. The spindle unit is equipped with two driving gear centers, which increase the range between high and low spindle speeds. In addition, four speed changes can be obtained from one set of gears instead of the usual two.

• Wider Feed Range

A wider feed range has been provided to enable the handling of a greater range of parts and materials at maximum cutting efficiency. The New Models 4A, 8A, and 12A have a ratio of 18 to 1 between high and low feeds — Model 16 has an even greater range.

• Greater Carriage Adjustment

Both front and rear carriage of the latest Sundstrand Automatic Lathes are adjustable full length between headstock and tailstock centers — another important new feature.

• Faster Set-Up

Convenient location of pick-off gears for changing spindle speeds and front and rear carriage feeds is provided. Feed and speed chart and pick-off gear storage compartment are readily accessible for quick set-up or changeover.

• Quick Cycle Changeover

Complete control of all cycles is provided by adjustment of dogs on a disk. Making cams is eliminated. Changing position of dogs on disk changes length of rapid approach, feed and rapid return strokes — enables operator to set up cycle quickly and change over from one job to another easily.

• Automatic De-Clutching

All new models have been provided with automatic declutching between spindle and spindle motor with self-adjusting magnetic clutch and brake for quick stopping of spindle rotation.

• Screw Feed to Front Carriage

All new Sundstrand Automatic Lathes have screw instead of rack feed to the front carriage — resulting in fine finish and long tool life.

4 Models Cover HP Range of 3 to 75 HP

	MODEL 4A	MODEL 8A	MODEL 12A	MODEL 16
SPINDLE MOTOR	3 to 10 HP	10 to 25 HP	20 to 50 HP	50 to 75 HP
SPEED RANGE (Type A) (Type B)	60 to 1800 RPM 120 to 3600 RPM	40 to 1200 RPM 80 to 2400 RPM	30 to 900 RPM 60 to 1800 RPM	15 to 750 RPM
FEED RANGE	.003 to .048 IPR.	.004 to .070 IPR	.004 to .070 IPR	.0025 to .100 IPR
FRONT CARRIAGE: Longitudinal feed with angular feed-in, max. Swing over cross slide, max. Rapid traverse rate	 5" 8¾" 275"	 6" 12½" 250"	 8" 15¼" 250"	 12" 17" 250"
REAR SLIDE: Max. Stroke	4"	5½"	6½"	8"
LENGTH BETWEEN CENTERS	15, 24 & 36"	24, 36, 48 & 60"	24, 36, 48 & 60"	36, 60 & 84"

FREE ADDITIONAL DATA

The complete new line of Sundstrand Automatic Lathes includes the Models 4A, 8A, 12A and 16 ranging from 3 to 75 HP. Write for complete information on these new machines today. Ask for bulletin **123.**

SUNDSTRAND

SUNDSTRAND
Machine Tool Company
2533 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

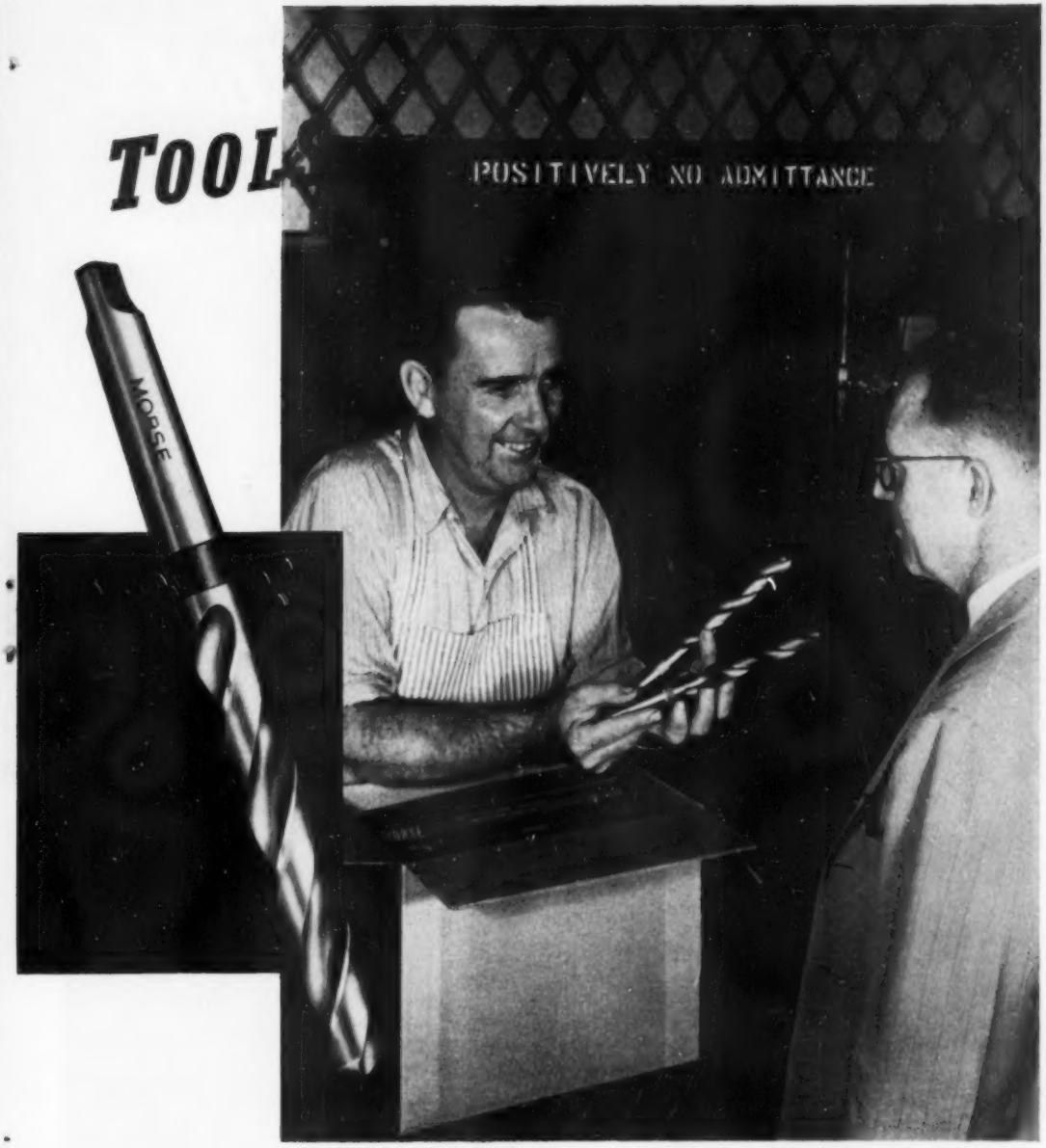
"It all adds up to this: MORSE ELECTROLIZED are the least expensive tools you can buy!"

The tool-crib boss never loses a chance to remind the works manager that: "Every new shipment of Morse Cutting Tools that comes into the plant *pays another bonus in plus-production!*"

That's right. For what Morse Tools *really* cut are *costs* . . . by cutting cleaner and faster . . . by staying on the job longer. And then, of course, to go even further and get the unmatched maximum in tool-life, *specify* Morse Electrolized Tools.

Whatever you need, in standard or special-purpose tools contact your Morse-Franchised Distributor. He'll work out the exact specifications that will give you top performance *on your particular job,* at lowest cost. He has the know-how and the assistance of Morse Engineers to solve any tooling problem.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco



MORSE

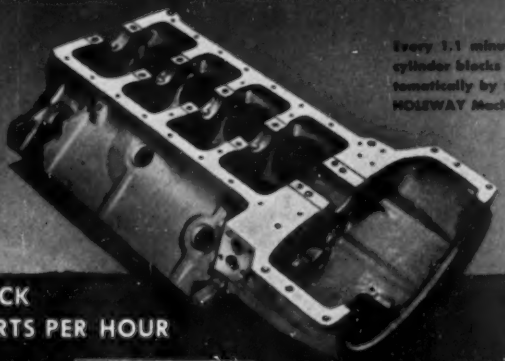
Cutting Tools

...buy them by phone from your Morse-Franchised Distributor and save ordering time

all 98 Operations

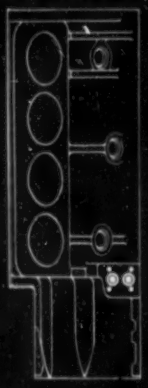
AND AUTOMATIC INSPECTION TOO!

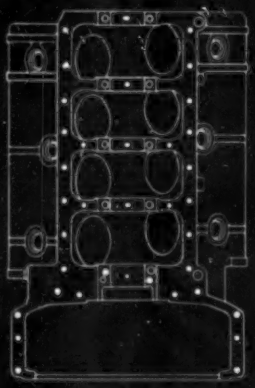
Including milling, trepaning, drilling, counterboring, reaming, chamfering, automatic turning of part 360° with vibrations to remove all chips, and automatic inspection.

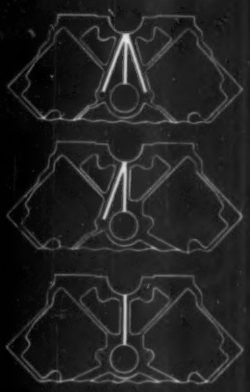


Every 1.1 minutes one of these cylinder blocks is completed automatically by the giant NATCO HOLEWAY Machine.

PART—CYLINDER BLOCK
PRODUCTION—50 PARTS PER HOUR







OPERATIONS

STATION #1 Load 1 part, pan face up.
STATION #2
- Left Vertical Head
  - Mill filter pad
- Right Vertical Head
  - Drill 14 holes to .257" dia.
  - Drill 2 holes to .368" dia.
  - Drill 1 hole to 1/2" dia. 3" deep.
  - Drill 4 holes to 15/32" dia.
  - Counterbore 1 hole to 17/32" dia.
  - Drill 4 holes to 1/4" dia. half depth.

STATION #3 Idle
STATION #4
- Right Vertical Head
  - Drill 6 holes to .257" dia.
  - Drill 2 holes to 11/32" dia.
  - Drill 4 holes to 1/8" dia. to depth.
- Left Horizontal Head
  - Trepan 2 holes

STATION #5 Idle
STATION #6
- Left Horizontal Head
  - Drill 2 holes to 5/16" dia.
  - Drill 1 hole to 1/2" dia.—3" deep.
- Right Vertical Head
  - Chamfer 24 holes
  - Drill 1 hole to 1/2" dia. to 6" depth.
  - Rough ream 1 hole to .437" dia.

STATION #7 Idle
STATION #8
- Left Horizontal Head
  - Drill 2 holes to 5/16" dia.
  - Drill 1 hole to 1/2" dia. to 4" deep.
- Left Vertical Angular Head
  - Drill 1 hole to 1/4" dia. half depth.
- Right Vertical Angular Head
  - Drill 1 hole to 1/4" dia. half depth.

STATION #9 Idle
STATION #10
- Left Horizontal Head
  - Drill 1 hole to 1/2" dia. to depth.
  - Chamfer 2 holes
- Left Vertical Angular Head
  - Drill 1 hole to 1/8" dia. to depth.
- Right Vertical Angular Head
  - Drill 1 hole to 1/4" dia. to depth.

STATION #11 Idle
STATION #12
- Right Vertical Angular Head
  - Drill 4 holes to 1/4" dia. half depth.

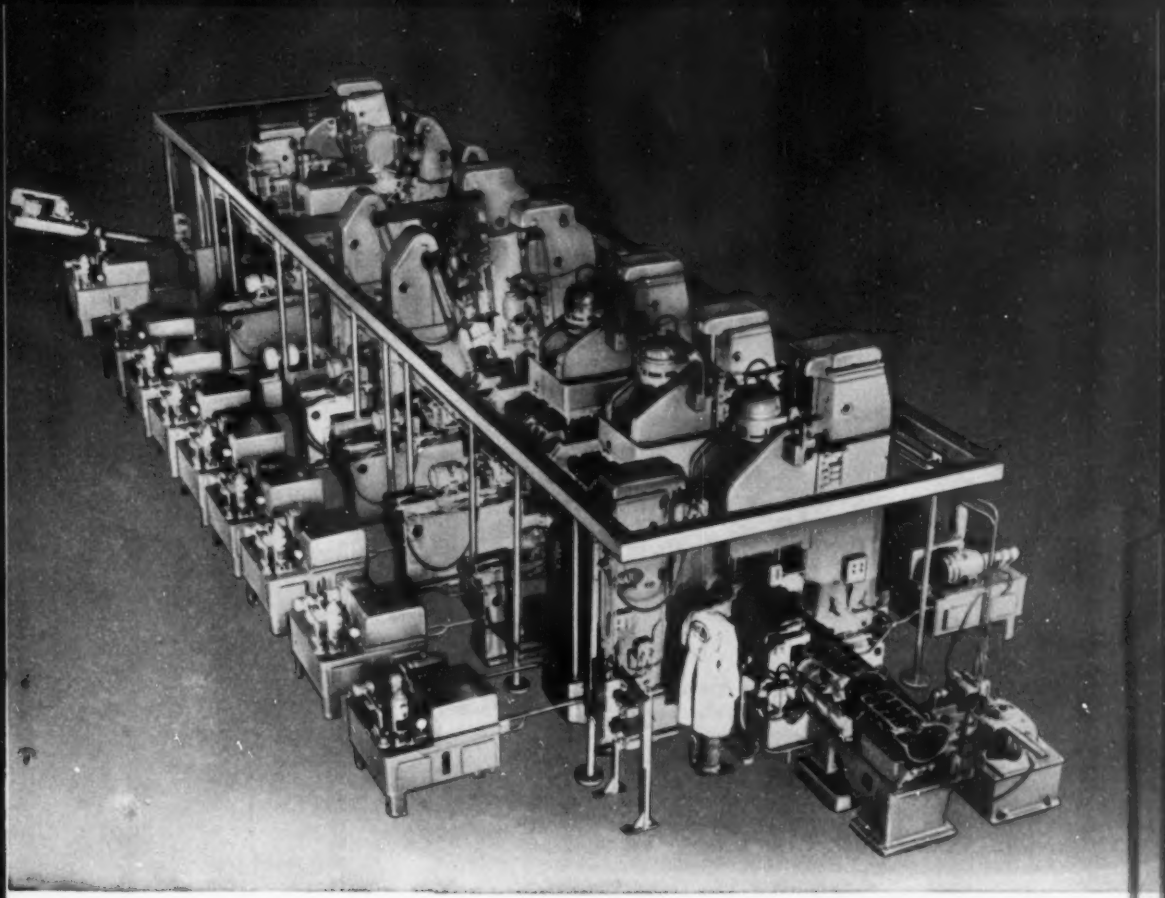
STATION #13 Idle
STATION #14
- Right Vertical Angular Head
  - Drill 4 holes to 1/8" dia. to depth.
- Left Horizontal Head
  - Drill 1 hole to 1/2" dia. to depth.
  - Chamfer 2 holes

STATION #15
- Turn 360° and vibrate to dump chips.

STATION #16
- Automatically inspect oil filter pad for broken drills and hole depth. Automatically inspect vertical holes for depth.

STATION #17
- Left Horizontal Head
  - Burr the trepan on 2 holes
- Right Vertical Head
  - Ream 1 hole to .5626"/.5623" and .5726"/.5723" diameters
  - Ream 2 holes to .3677"/.3674" dia.

STATION #18 Unload 1 part.



This single **NATCO** HOLEWAY Automatic Processing Machine completes **ALL 98** pan face operations on this engine block automatically **PLUS** automatic inspection at the rate of 50 parts per hour... nearly one part a minute!

Call a Natco Field Engineer

To help you solve your problems in Drilling, Tapping, Boring & Facing.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices | *1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit*
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"MARVEL" HAS
always had the edge

MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high speed steel cutting edge electrically welded to an exceptionally tough, strong alloy steel body.

The High-Speed-Edge does the cutting while the alloy back, with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production and lower cost per cut, comes the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—*they will not shatter.*

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary blades.

1. High-Speed-Steel cutting edge.

2. Tough unbreakable alloy steel body with hardened eyes.

1. & 2. Integrally welded to make a fast-cutting, long lasting composite blade that is *positively unbreakable.*

ARMSTRONG-BLUM MFG. COMPANY

"THE HACK SAW PEOPLE"

5700 BLOOMINGDALE AVENUE **CHICAGO 39, ILLINOIS**

Metal Cutting MARVEL SAWS

Better Machines—Better Blades

Operators acclaim it as a money maker!

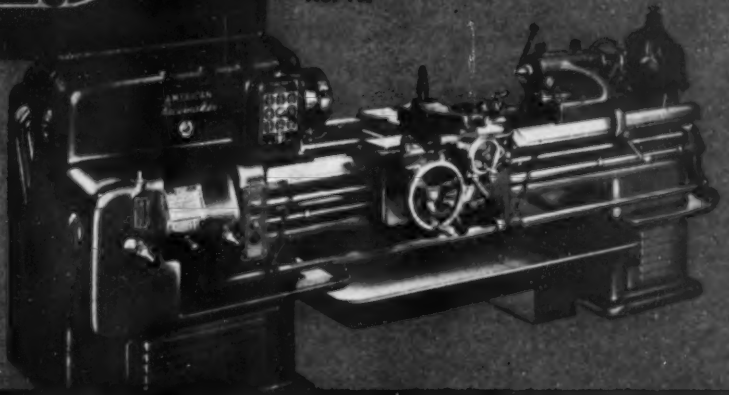
Wherever operators enthusiastically acclaim a feature as a money maker for them it is demonstrably believed that it is likewise a money maker for the owners.

The direct reading speed control of "AMERICAN" Pacemaker Lathes is a real money maker and operators freely admit it. It makes their work easier; they can secure the right speed quicker; they produce more work because of it and, what is of paramount importance, the pay roll dollar buys more as a consequence.

The direct reading speed control unit shows at a glance the available speeds and the simple means of securing them. Imagine all spindle speeds being secured through only two conveniently placed direct reading levers without having to refer to index plates or having to retain lever positions in mind.

Furthermore, the simplicity of this mechanism and the infinitesimal time required to make speed changes inspire operator confidence and encourage him to make changes necessary to secure correct cutting speeds.

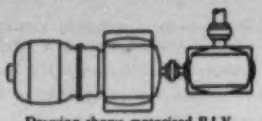
This and other fine features of the "AMERICAN" Pacemaker are thoroughly illustrated and described by Bulletin No. 16.



THE AMERICAN TOOL WORKS CO., Cincinnati, Ohio, U. S. A. LATHES AND RADIAL DRILLS

Ask yourself these speed reduction questions . . .

1 Do I want high-ratio reduction with right-angle takeoff?

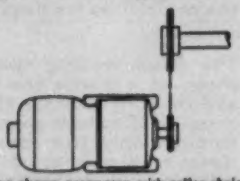


Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

Then your answer is a LINK-BELT Worm Gear Drive

Reduction ratios: 5.1:1 to 8000:1
Torque: 1,400 to 125,000 in. lbs.
Output shaft rpm: 0.22 to 564

2 Is space at a premium?

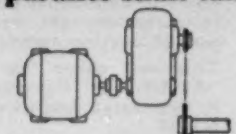


Drawing shows gearmotor with roller chain drive.

Then your answer is a LINK-BELT Gearmotor

Reduction ratios: 6.2:1 to 292:1
Hp range: 1 to 30
Output shaft rpm: 6 to 290

3 Will I need high hp capacity with parallel shaft takeoff?



Drawing shows motor with herringbone gear and roller chain drives

Then your answer is a LINK-BELT Herringbone Gear Drive

Reduction ratios: 2.84:1 to 318:1
Hp range: ½ to 1000
Output shaft rpm: 2 to 600

Yes, LINK-BELT builds all 3

WHATEVER factor governs your speed reducer selection—ratio, space, shaft position, shock loading—you can get the exact answer to your needs from Link-Belt's complete line of enclosed gear drives.

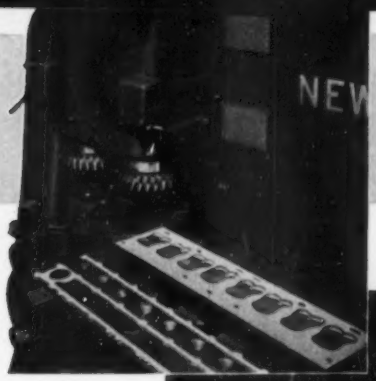
For Link-Belt builds a full range of sizes and ratios in all three types—Helical, Herringbone and Worm. When a Link-Belt power transmission engineer analyzes your conditions, he can recommend the specific drive to meet your specialized requirements.

For complete information, call the Link-Belt office near you.

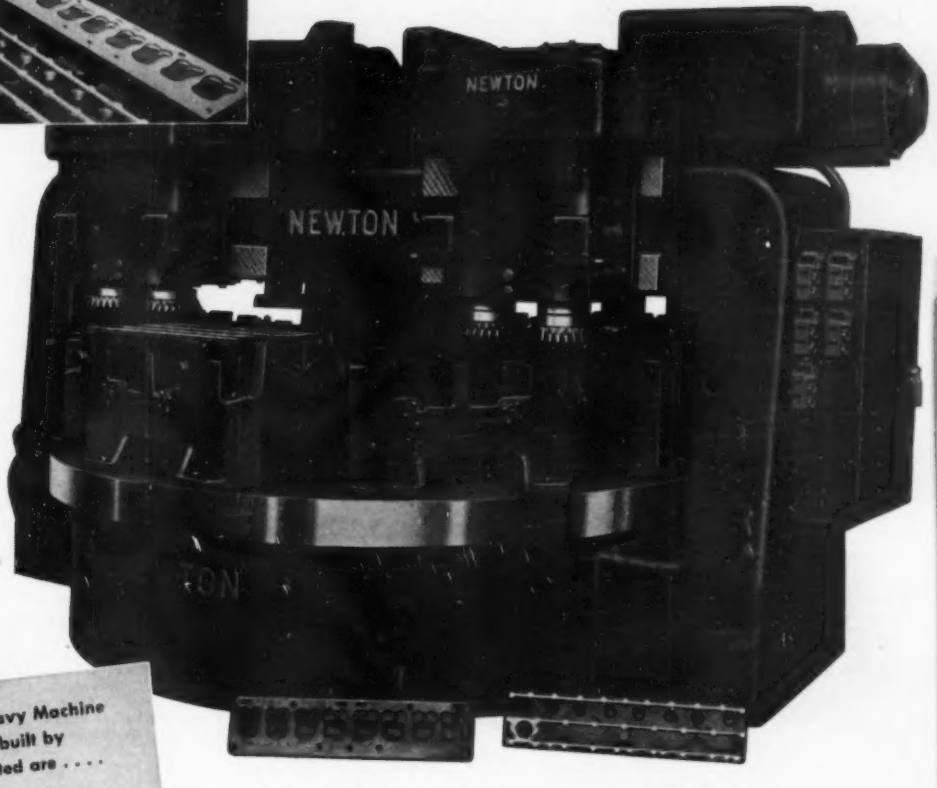
LINK-BELT

ENCLOSED GEAR DRIVES

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,899



NEWTON EIGHT SPINDLE TWO STATION UNIT HEAD ROTARY CONTINUOUS MILLING MACHINE



Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

Designed for high production milling of automotive cylinder blocks and heads, transmission cases and similar parts, this machine provides new rigidity and power for today's cutting materials. It is equipped with two sets of roughing and two sets of finishing spindles. Operating stations on both sides of the machine make possible twice the productive capacity of the conventional single station machine.

For full information send for Bulletin No. 650

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED
MACHINE TOOL CORPORATION

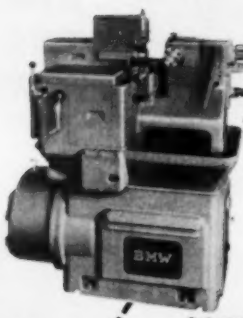
SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

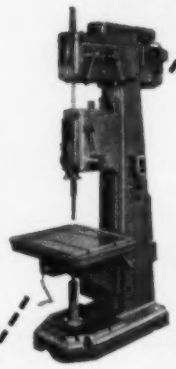
AVAILABLE FROM STOCK

Delivery helped sell these tools... now Industry's sold on their performance

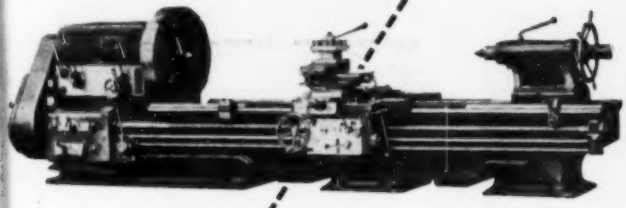
Production-minded plants want more than just delivery on machine tools – foreign or domestic. They want performance and reliable servicing–and they're getting both – reordering these German precision-built tools. Write for complete details.



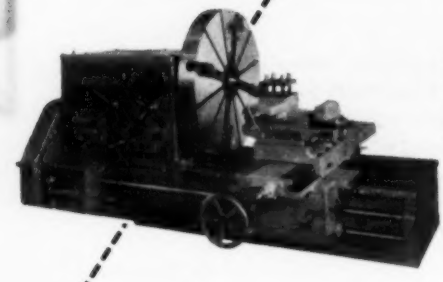
Automatic Screw Machine by BMW ...meets all U. S. operation and production demands. Collets interchangeable with American equipment. Single spindle. Designed to take full advantage of modern high-speed cutting tools. All cams, trips and stops easily accessible, can be positively locked. Bar capacity ⅝" diameter. Speeds up to 5800 rpm.



Quick changeover from job-to-job on short or long run heavy-duty drilling production is assured by easily adjustable head and table on new ALFING DRILL PRESS. Crank *raises* or *lowers* table; headstock moves 6" up or down by hand on scraped ways. Easy-to-reach controls cut handling time, too. 9" spindle stroke, driven by either V-belt or flange-mounted AC motor. Motor speed 900 rpm. Drilling capacity of 1" in steel; 1¼" in cast iron. 8 spindle speeds from 150 to 1640 rpm. Drilling feed by hand or power. Table surface 26" x 28". Distance between spindle and table, 23" max.; spindle and base plate, 25"-40".



Extra Heavy-Duty Lathes...Precision-built to American standards by internationally known VDF Works. Two models with 30¼" and 48¼" swing; turning lengths, 20' and 22' 11"; maximum weight of work 6 tons and 10 tons. 30 H.P. and 50 H.P. A.C. base motors. 36 spindle speeds. Scales have inch graduation.



For machining jet engine parts and T-turning bulky work– HEYLIGENSTAEDT 3 PB Facing Lathe. Turning diameter 51" over bed, 67" in gap. Infinitely variable spindle speeds over 1:6 ratio: 3 back gears; power feed in carriage; lower and upper cross slides. Models available without leadscrew or with movable bed.

Send for current stock list

Lathes	Grinders
Milling Machines	Drill Pointers
Jig Borers	Power Hack Saws
Thread Grinders	Screw Machines
Drill Presses	Balancing Machines
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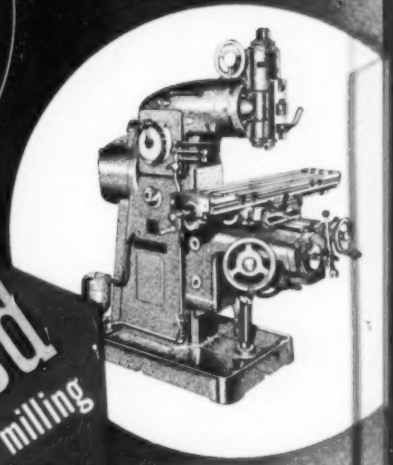
Replacement parts for all machines in stock at our Cleveland Service Center

KO CO. INC. INDUSTRIAL IMPORTERS

KURT ORBAN COMPANY, INC.

205 East 42nd St., New York 17 • 4220 Prospect Ave., Cleveland 3 • 19450 James Couzens Highway, Detroit 35
8735 Melrose Ave., Los Angeles 46 • **Canadian sales by European Machinery Ltd., 11 King St. W., Toronto, Canada**

B·S

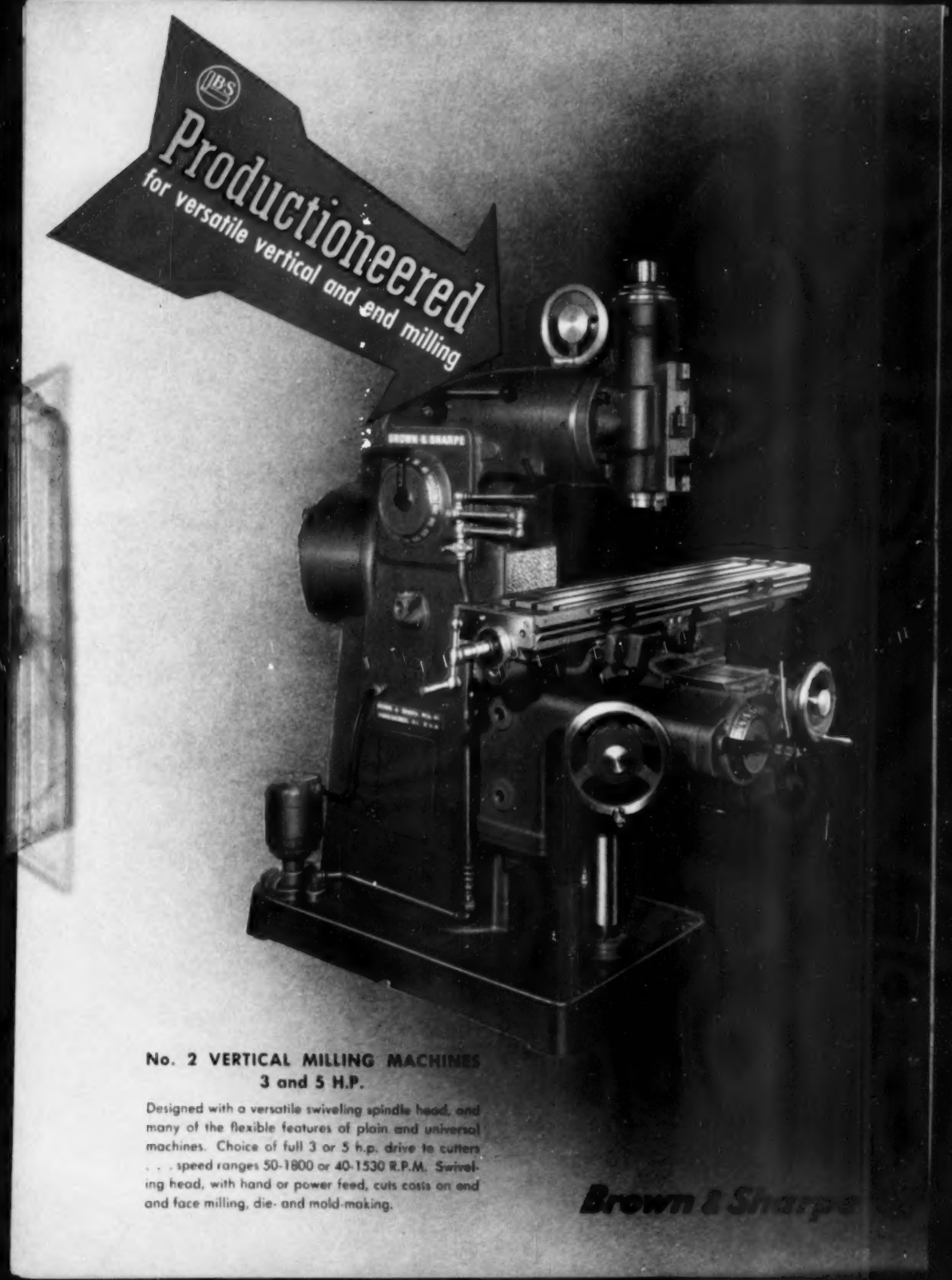


Productioneered

equipment for all-round production milling

Today especially — when sudden switchovers from civilian to military production are common — the characteristic flexibility of Brown & Sharpe Machines and Tools is invaluable to milling departments. These products are "Productioneered" for emergency as well as normal production . . . specifically engineered for high output with uniform accuracy on a wide variety of small-to-medium-size parts.

Brown & Sharpe



No. 2 VERTICAL MILLING MACHINES
3 and 5 H.P.

Designed with a versatile swiveling spindle head, and many of the flexible features of plain and universal machines. Choice of full 3 or 5 h.p. drive to cutters . . . speed ranges 50-1800 or 40-1530 R.P.M. Swiveling head, with hand or power feed, cuts costs on end and face milling, die- and mold-making.

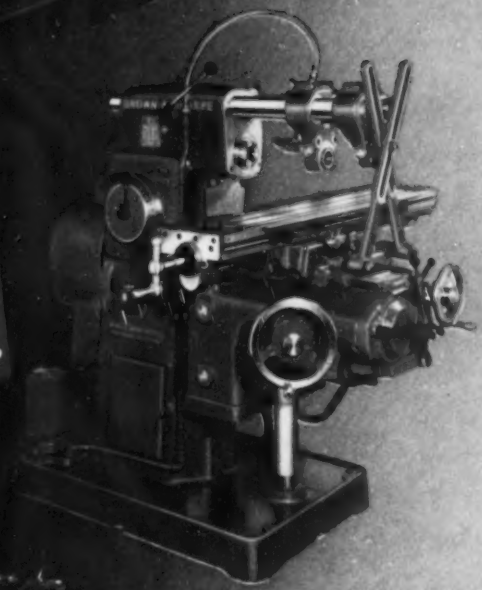
Brown & Sharpe

Productioneered for long and short runs, high precision

No. 12 PLAIN MILLING MACHINES
3 and 7½ H.P. Spindle Drive

Here are excellent electrically controlled manufacturing-type machines for mass-producing small-to-medium size parts, accurately, at low cost. Speeds: 25 to 1050 and 25 to 1790 R.P.M. The 7½ h.p. model handles many moderate-sized carbide milling jobs.

Productioneered for more flexible set-up and operation



No. 2 PLAIN MILLING MACHINES
3 and 5 H.P.

Unusual handling flexibility is provided in these machines by special features . . . tri-motor drive, column-and-knee type design, ample feed and speed rates, extended spindle face for rigid cutter support. Full 3 or 5 h.p. drive to cutters.

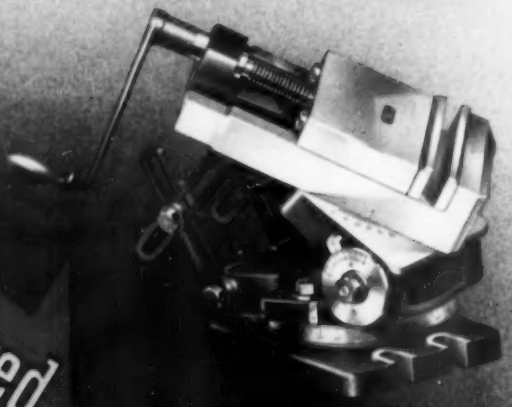
Productioneered for high-level production of small parts

No. 000 PLAIN MILLING MACHINE

Designed for highly efficient production of small parts in assemblies such as sewing machines, radios and firearms. Simple to set up, fast in operation, exceedingly accurate. Automatic operating cycle. Broad ranges of speeds and feeds.

Productioneered

to aid in efficient, accurate output



BROWN & SHARPE VISES

Provide easy, secure holding for milling, drilling and grinding. Wide range of styles and sizes: Toolmakers' (illustrated), has vise proper adjustable to any angle. . . Cam type, for fast handling of duplicate pieces. . . Swivel . . . Flanged . . . and Plain styles.

JOHANSSON GAGE BLOCKS

The surest way to maintain uniform precision throughout production is to inaugurate regular checking of your measurement standards in every department with accurate Johansson Gage Blocks. It will cut lost time and spoilage. 3 guaranteed accuracy standards: .000002", .000004" and .000008" per inch.

CUTTERS AND END MILLS

The clean-cutting, long-wearing qualities of these cutters help to maintain machine output at highest volume levels. The complete line of Brown & Sharpe Cutters includes outstandingly productive styles for every type of milling job.

WRITE FOR COMPLETE INFORMATION ON ANY OF THE BROWN & SHARPE PRODUCTS LISTED BELOW

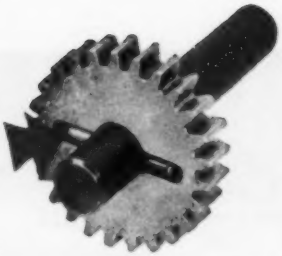
WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe

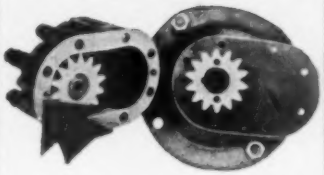
Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories
Machinists' Tools • Electronic Measuring Equipment • Johansson Gage Blocks • Permanent Magnet Chucks • Pumps

BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.

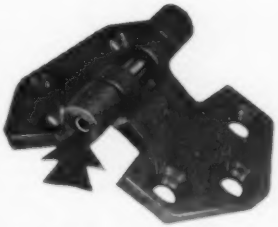
PRINTED IN U. S. A.



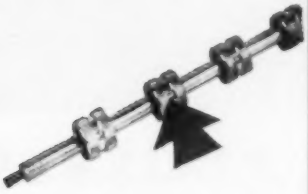
REPLACING A HUB ON A GEAR . . . Rollpin, self-retained in shaft, is simply snapped into molded slot to position sintered gear. This application, by Ditto Inc., effects major savings in assembly. Rollpin's high shear strength is particularly valuable here.



REPLACING A MACHINED PIN . . . In the lubrication pump assembly of the Cummins HR-400 diesel engine, two Rollpins are used as positioning dowels. Rollpins are self-retaining in production-drilled holes . . . quick to assemble and easy to remove.

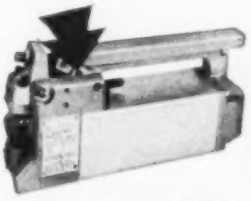


REPLACING A HEADED PIN . . . In this hinge pin application, Rollpin is simply and inexpensively driven in place, greatly reducing assembly costs. Constant spring tension holds Rollpin firmly in place . . . eliminates loosening of hinge due to wear.



REPLACING A SET SCREW . . . Paper feed rollers are quickly, economically pinned to shaft by Rollpins in this office machine made by Ditto Inc. Flush fit affords neat appearance . . . spring tension assures positive, permanent positioning of rollers.

REPLACING A RIVET . . . Rollpin serves as guide shaft for spring-loaded electrical interlock contacts. The Square D Company reports that rivet failure previously occurred at the clinched end under normal operating impact and vibration.



REPLACING A BOLT AND NUT . . . Rollpins act as fasteners and pivots for the linkages in this Miller Electric Welder. Rollpins may be used with a free fit in outer or inside members depending upon product design requirements.

6 more examples of assembly-time saving with ROLLPIN

TRADE MARK

Rollpins are slotted, tubular steel, pressed-fit pins with chamfered ends. They drive easily into holes drilled to normal tolerances, compressing as driven. Reaming, tapering, extra assembly steps are eliminated. Rollpins are *locked* in place by the constant pressure they exert against hole walls. Inserted with an automatic press or by hand, Rollpins are readily removable with a drift or pin punch—and reusable again and again.

Elastic Stop Nuts with the famous red collar are another ESNA® product

FOR DESIGN INFORMATION—fill out and mail our coupon. If your plans include applications similar to those on this page—or clevis pins, keys, taper pins or stop pins—you can't afford to be without details on how much faster and cheaper Rollpin can do the job.

Dept. R6-99, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free information on ESNA self-locking fasteners:

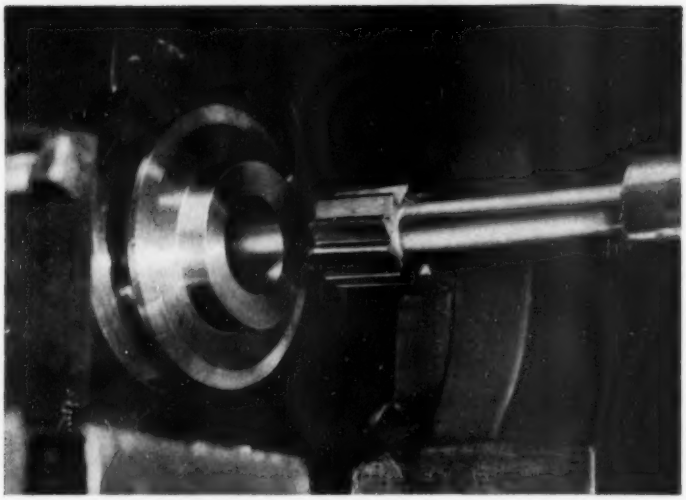
☐ Rollpin bulletin and sample Rollpins ☐ AN-ESNA conversion chart
☐ Elastic Stop Nut Bulletin ☐ Here is a drawing of our product. What fastener do you recommend?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

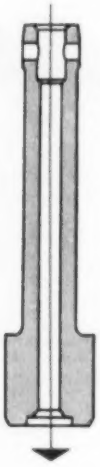


REAM FINE FINISHES

ON SCREW MACHINES AND TURRET LATHES

20-25 micro-inch finish

Reamed finishes which were never considered possible are now obtained on production jobs with Barber-Colman Oil-Feed Reamers. On this job, 1000 pieces were reamed to a surface finish of 20-25 micro-inches before it was necessary to sharpen the reamer. The feed is 1.75" per minute at 280 RPM, requiring 30 seconds to ream the 7/8" length of cut. The material is AISI C 1137 steel. Finishes like this can be obtained in regular production with Barber-Colman Oil Feed Reamers.



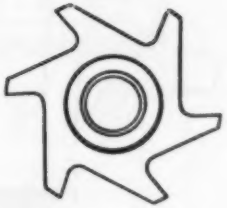
oil feed

An outstanding feature of these oil-feed reamers is that the oil feeds through the body of the reamer to flush the chips away from the cutting area. Other types of reamers tend to pack the chips in front of the reamer, increasing the chance for "pick up" which often ruins the finish and shortens the life of the tool. As the oil hits the end of the hole, it is forced back between the flutes, carrying the chips with it. Another aid to extending tool life is that the oil reaches the cutting area on jobs which could not otherwise effectively employ a free flow of coolant.

DESIGNERS OF STANDARD AND SPECIAL

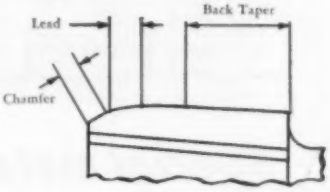
irregularly-spaced flutes

Irregular spacing is a standard feature of all Barber-Colman Oil-Feed Reamers. This type of spacing provides a smooth cutting action and fine finish and prevents the reamer from forming "welts". Thus, the design of the spacing in conjunction with the oil-feed feature allows these reamers to produce surface finishes which formerly required a secondary finishing operation. To aid in checking the reamer diameter, the flutes are spaced diametrically opposite each other so that they can be inspected with a micrometer.



cam-controlled sharpening

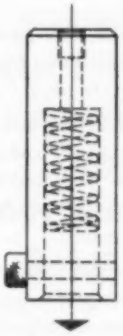
The profile form on the reamer flutes is important in obtaining the best finish and tool life. Following a 30° chamfer, the lead is blended into a radius and followed by a straight portion which irons out the feed marks. This combination produces exceptionally fine finishes. Also, through the use of the Barber-Colman system of sharpening, a theoretically sharp cutting edge is produced rather than a cylindrical land. The Barber-Colman system is cam-controlled so that each reamer is sharpened with exactly the same profile. These are features which are available in no other type of reamer.



self-centering floats

These spring-type floats hold the reamer firmly, eliminating any sagging. Its simple design, consisting of only the holder, drive pin and spring, makes it easy to operate and maintain. An opening through the center of the float allows the oil to reach the reamer. Only two floats are required to cover the complete range of sizes, although a float of extra length is available for the larger sizes. These reamers are available for diameters of .344″ through 1.380″.

Ask for new bulletin listing specifications and prices or call your nearest Barber-Colman representative.



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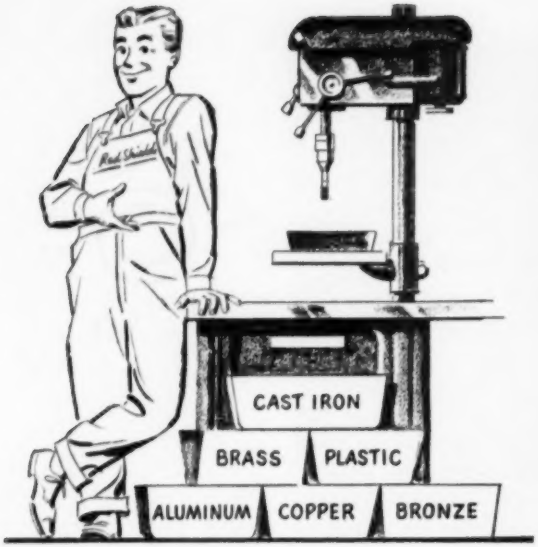

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increase output—

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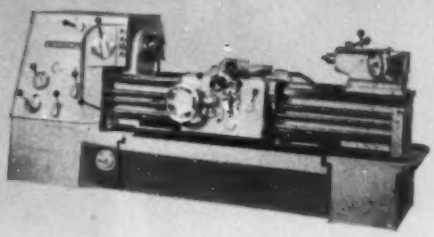

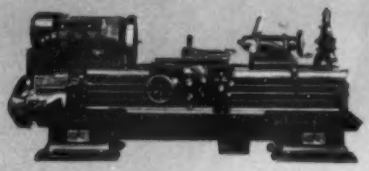

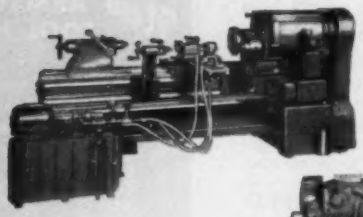

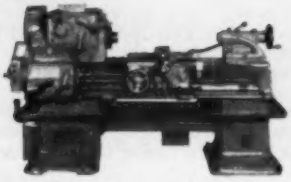

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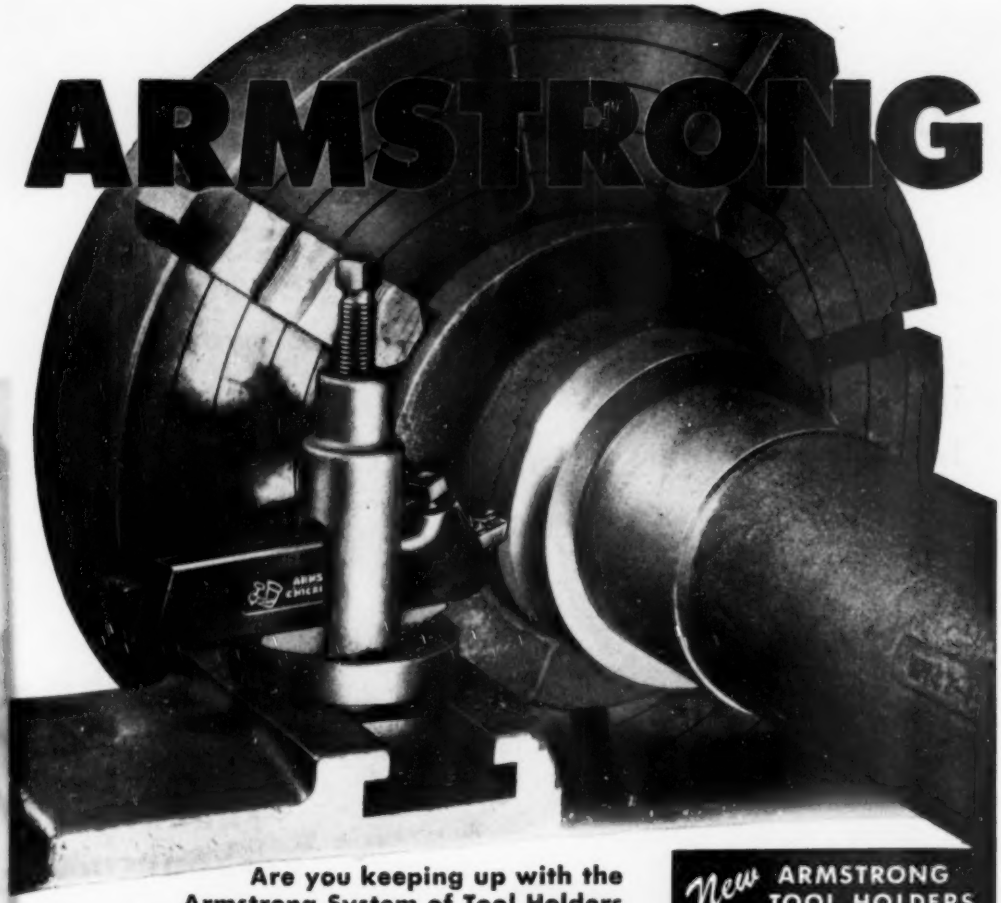

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100A

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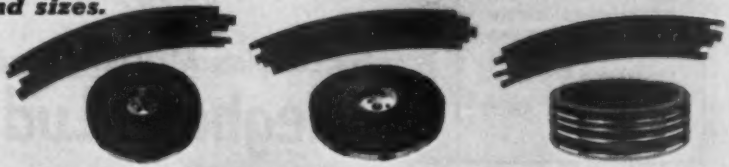

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It may be that your requirements call for mill shipments. If so, you can rely on us to schedule material for you without delay. *But*—if you depend entirely or in part upon ordering High Speed and Tool Steels in smaller lots—and want to know where you can get them *quickly*—you'll find A-L's book of "Warehouse Stocks" mighty handy to have in your desk. ● Write for your copy *today! Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

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AMF reports that results have been immediate and gratifying! Their Fosdick Automatic Positioning Machine produces center-distance accuracy on complicated parts to ±.0001″ . . . *has already boosted production on some parts as much as 2½ times!* Small lots of intricate parts are duplicated—even years apart—with faithful precision—thanks to Fosdick's duplicating bars which eliminate costly set-up time.

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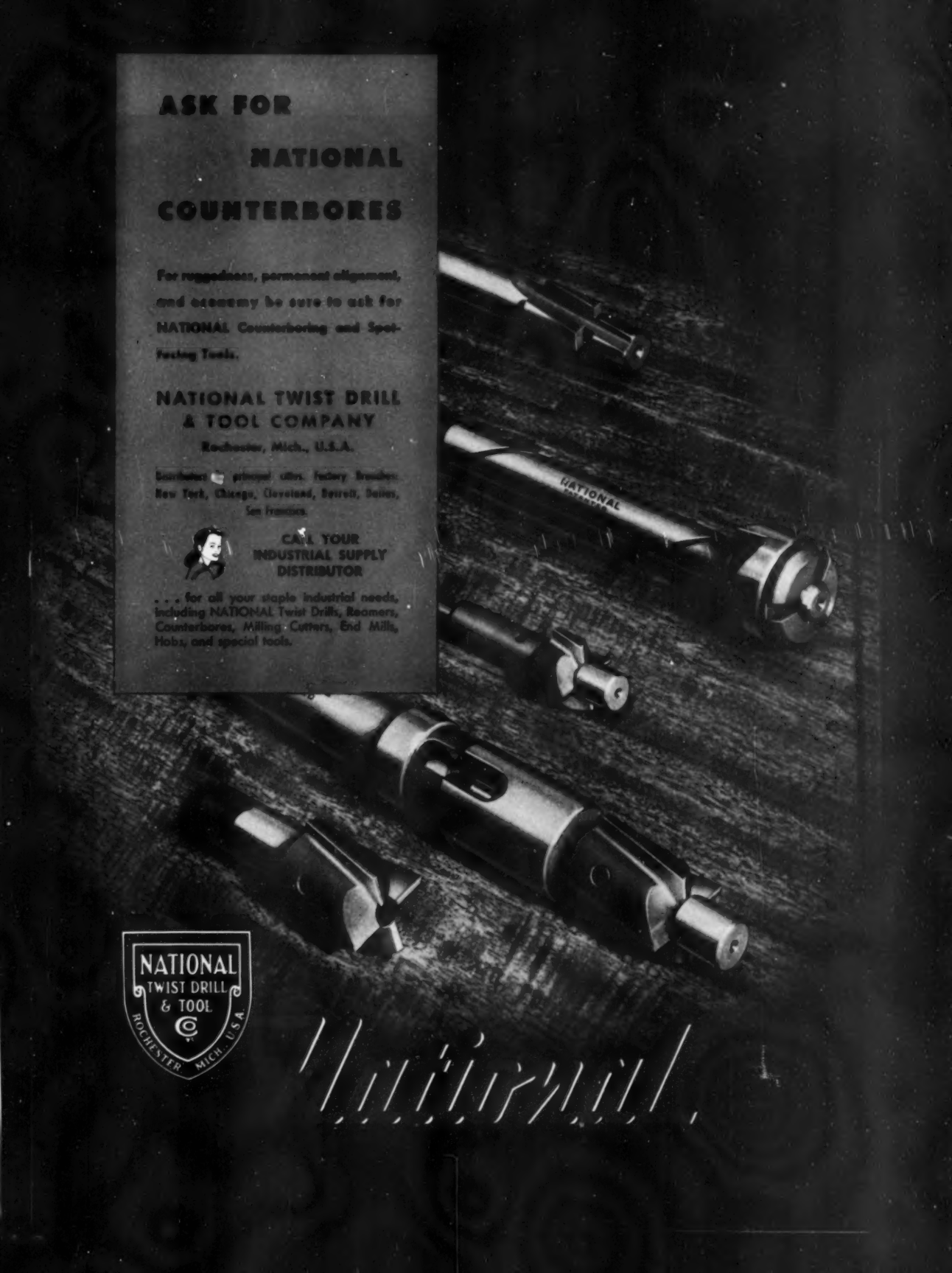
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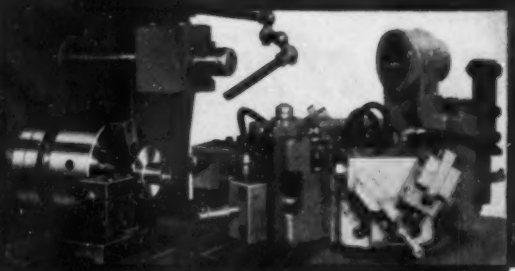
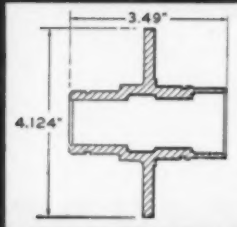


POTTER & JOHNSTON 3U SPEED-FLEX



All the surfaces of this steel forging (indicated by heavy lines) were precision machined in one operation.

The Potter & Johnston 3U Speed-Flex Automatic Turret Lathe is specifically designed to machine small, complex parts rapidly, accurately and economically. Completely automatic operation and electro-pneumatic controls make it easy for one man to handle several machines, affording you full opportunity to benefit from divided labor costs. High spindle speeds and ample power take full advantage of fast-cutting carbide tools. Rugged, rigid, high precision construction assures long life, lasting accuracy and a full return on your investment. Meet today's demand for greater output at lower cost with a Potter & Johnston Automatic Turret Lathe equipped with expert P&J Tooling.

See for yourself how the 3U Speed-Flex can bring new standards of efficiency and economy to your difficult chucking and turning jobs. Send today for your copy of Bulletin 145 that contains complete data, specifications and a pictorial description of the Model 3U and all its advanced engineering features.

POTTER & JOHNSTON COMPANY

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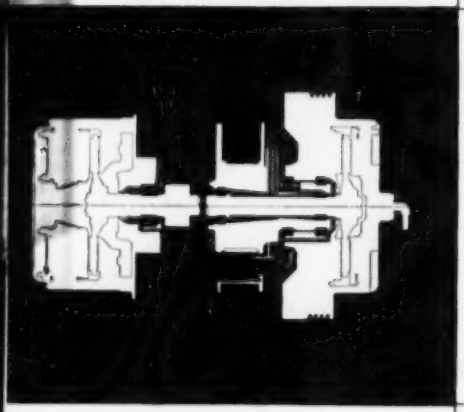

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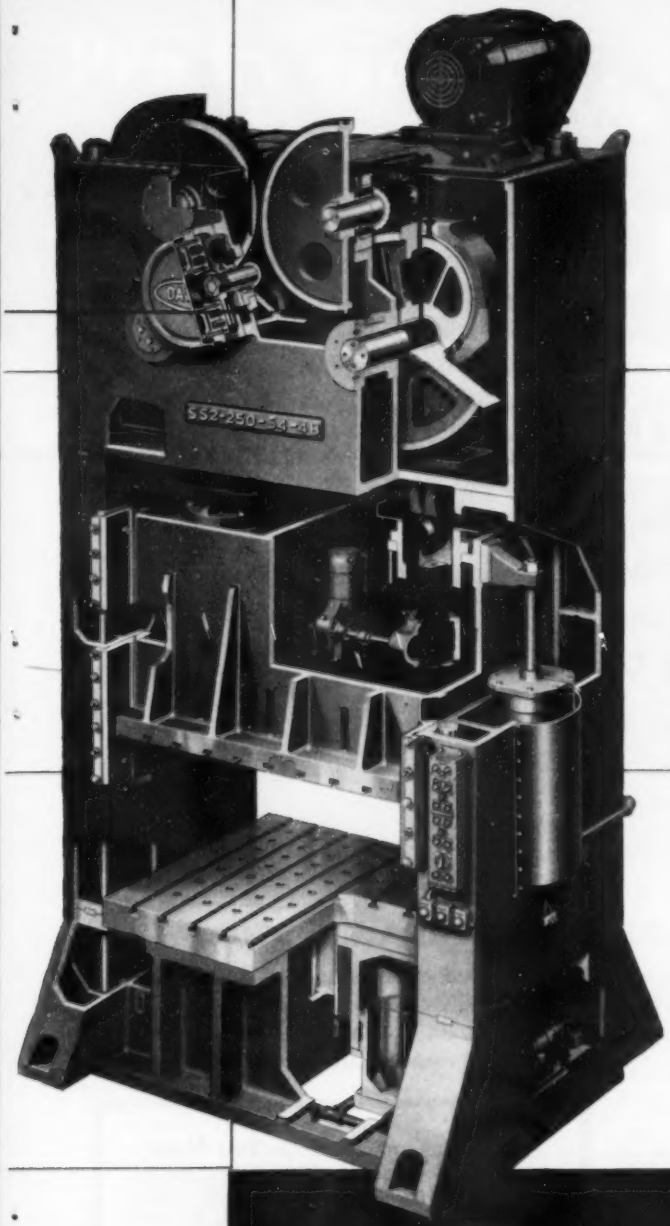
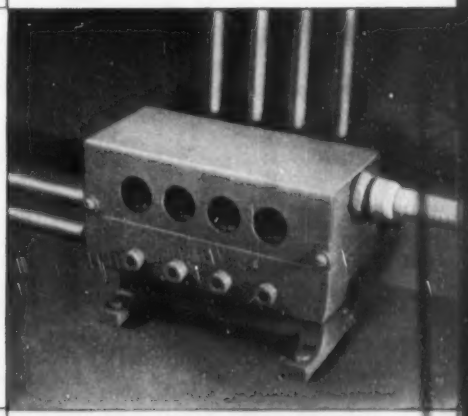
POSITIVE OIL LUBRICATION—ELECTRICALLY CONTROLLED

Diagram at left indicates important drive shaft bearing lubrication system. Oil, shown in color, is piped under pressure to the bearings—all anti-friction type. Any drop in oil pressure below normal operating levels in this completely automatic system stops the press—positive protection against damage due to lack of lubrication.





AUTOMATIC GUARDIAN OF PRESS LUBRICATION

Close-up view of special Danly oil pressure safety switch. This switch completes the Danly lubrication protection system by stopping the press immediately in the event of oil stoppage in any line—and indicates the faulty line!

CONTINUOUS AUTOMATIC OIL LUBRICATION INCLUDES GIBS

Cutaway at left shows how Danly Presses provide complete automatic lubrication (in color) to the drive mechanism and slide—including gibs.

- *Maintenance is reduced by preventing needless breakdowns arising from irregular or insufficient lubrication.*
- *Oil supplied continuously under pressure to gibs permits extremely close slide adjustment—prolonging die life.*

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Allis-Chalmers Matched Motors, Control and V-Belt Drives Save Design Time and Cut Manufacturing Cost

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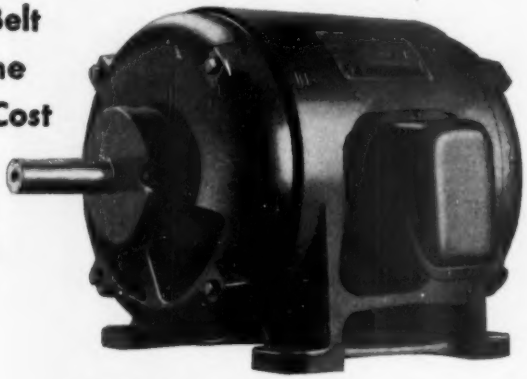

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Fixed speed and *Vari-Pitch* sheaves with stationary or motion control. Famous grommet belt construction. Most complete line of V-belt drive equipment in the industry.

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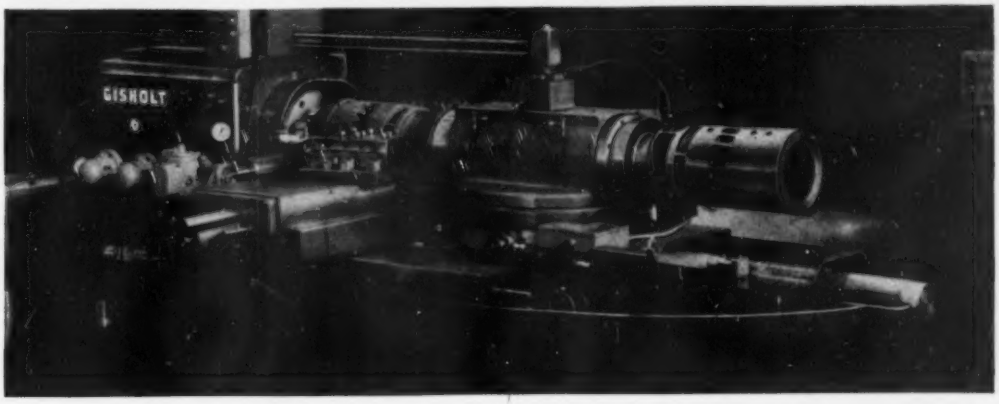
Production Pointers from GISHOLT

GISHOLT

TIME-SAVING IDEAS

Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.



No. 24 Hydraulic Automatic Lathe with special turret having two mandrels.

PIVOTING MANDRELS END LOADING TIME LOSS

No. 24 Hydraulic Machines One Part While Another Is Loaded

In this interesting production pointer, loading time is actually part of *machining* time—with one workpiece being put on the lathe or taken off while another is being machined.

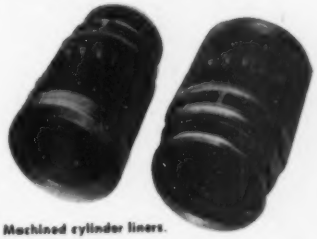
The part is a diesel engine cast-iron cylinder liner and the machine is a No. 24 Hydraulic Automatic Lathe which has two identical expanding mandrels on an indexing carriage. Twin arbors are mounted 180° apart with ratchet teeth for driving.

Single Automatic Operation

The automatic cycle begins with carriage moving forward until the arbor engages driving teeth in the spindle nose. This brings in the front and rear slides carrying a total of 28 tools which machine all outside diameters, faces and chamfers. With cuts completed, the tool slides retract, the work carriage traverses back and automatically indexes the new workpiece into position.

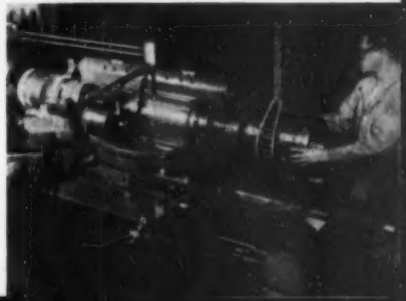
This feature achieves important savings in time and added production. With a finished liner being unloaded and new workpiece put in place *during* machining, loading and unloading time are absorbed in the machining cycle. Hence, the machine spends most of its time making chips. The only lapsed time between machining is for traversing up, back and for indexing—less than half a minute! Machining time for this liner—and other sizes handled on other No. 24 Hydraulics—is below 3 minutes . . . good reason why this manufacturer standardizes on the efficiency of the No. 24 Hydraulic Automatic Lathe for these operations.

With Twin Mandrels This No. 24 Hydraulic Provides Continuous, Fast Production with No Lost Loading Time.



Machined cylinder liners.

Operator loads new workpiece while another liner is being machined.



GISHOLT

TIME-SAVING IDEAS

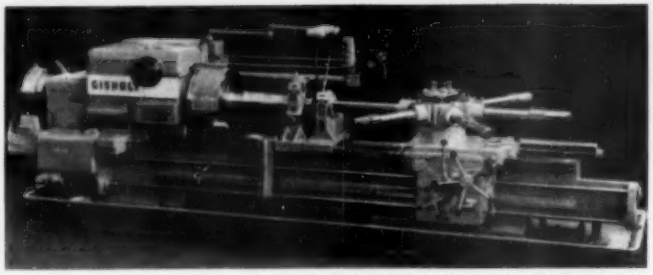
HOW THIS DIFFICULT BORING JOB BECAME AN EASY ONE . . . *MORE ACCURATE, TOO*

Saddle Type Turret Lathe Is the Answer

Here's the kind of job that qualifies as a tough one, any day. Yet see how this turret lathe takes it in stride. The part is an alloy steel propeller shaft measuring 36½"—with various inside diameters to be machined.

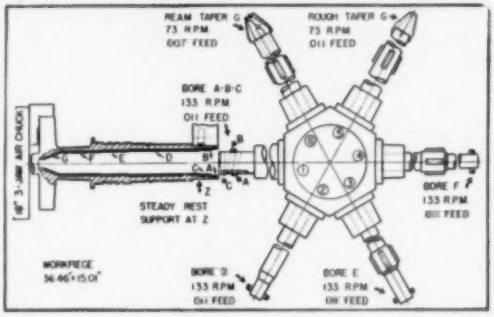
A standard 2L Saddle Type Turret Lathe is "tailored" for the assignment: In place of the side carriage there is a quick-clamping steadyrest and boring bar support. For safety and convenience, the handwheel for the Hydraulic Speed Selector and the emergency push-buttons are duplicated at the working position.

As shown in the layout, seven different internal surfaces are handled. One of these is the taper bore which is rough and finish reamed. Coolant flows through the boring bars directly on the tool bits. Floor-to-floor time with this well planned setup is 30.5 minutes with a high degree of accuracy, proving again that tough jobs can be easy ones on a Gisholt Saddle Type Turret Lathe.

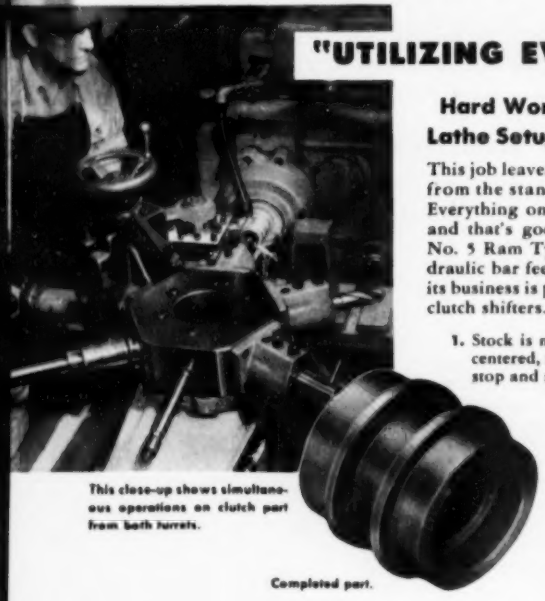


Good setup for deep boring. Note added steadyrest and boring support. Also duplicate controls.

Tooling layout for boring propeller shafts.



This Saddle Type Lathe Completes All These Difficult Interior Surfaces in One Chucking.



This close-up shows simultaneous operations on clutch part from both turrets.

Completed part.

"UTILIZING EVERYTHING BUT THE SQUEAL"

Hard Working Ram Type Lathe Setup for Clutch Parts

This job leaves nothing to be desired from the standpoint of efficiency. Everything on the lathe is busy . . . and that's good! The machine is a No. 5 Ram Type with standard hydraulic bar feed and collet chuck and its business is producing 2¼" sliding clutch shifters. Here's how it does it:

1. Stock is moved out to length and centered, using combination stock stop and starting drill.
2. Counter-bore and small bore are drilled from the hexagon turret while both hubs are turned from square turret.
3. Center recess is formed from square turret and the end is then faced from rear tool post.
4. Grinding relief is turned (both sides of center recess) from square turret.
5. Small ID is finish bored and reamed from hexagon turret.
6. Counterbore is finished from hexagon turret and cut off from square turret.

Floor to floor time is 7 minutes—with every minute of the way made easy for the operator by these Gisholt features which provide: 1. Shifts to new spindle speeds by a simple twist of the Hydraulic Speed Selector. 2. Proper spindle speed for reaming the small ID by merely tapping the Hi-Lo lever. And, 3, ease of changing feed by setting a single dial-type lever.

A Splendid Example of Well Planned Tooling and Simultaneous Machining from Both Turrets — Gives Maximum Efficiency to This Ram Type Turret Lathe Job.

GISHOLT

TIME-SAVING IDEAS

A ONE-MAN, TWO-MACHINE TEAM

Gear Blank Savings Are "Automatic"

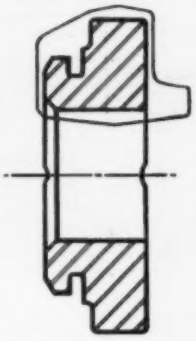
It's a case of perfect teamwork . . . the way these two 2F Fastermatic Automatic Turret Lathes turn out gear blanks. Splitting the job accounts for important savings in time, money.

First machine: With the steel forging held on the chucking hub, three passes are taken through the bore and two passes across the face, then rough turn and chamfer—all handled from the turret. Rough and finish grooving is done by tools on the independent front and rear cross slides. Time: 5 minutes.

Second machine: Part is held in the bore while turret tools remove chucking hub, semi-finish and finish the various diameters and chamfer. The two cross slides complete the rough and finish facing. Time: 3 min.

Not only is gear blank production made fast by this two-machine setup, but it's planned for real economy with one operator tending both lathes. Moreover, with the chance for human error eliminated by the automatic operation of the Fastermatics, there's assured accuracy with true concentrics and parallels.

For gear blank work—or any kind that belongs on an automatic turret lathe, investigate the Fastermatic.



Operations required to finish gear blanks. Light line indicates rough forging.

Rough forging and completed blank.

First operations on gear blanks are performed by this Fastermatic.

On This Gear Blank Job, Operator Is Needed Only for Loading and Unloading—the Two Fastermatics Automatically Perform All Work.

PUTS FINISHING TOUCHES TO CRANKSHAFTS — *BUT FAST*

Simplimatic Does Neat Job on Counterweights

All Crankshaft Counterweights Are Turned and Beveled in a Single Automatic Operation by the Simplimatic.

Crankshafts always make interesting machining jobs. On this one, for a V-8 engine, a Simplimatic Automatic Lathe takes care of the six counterweights. Here's the setup:

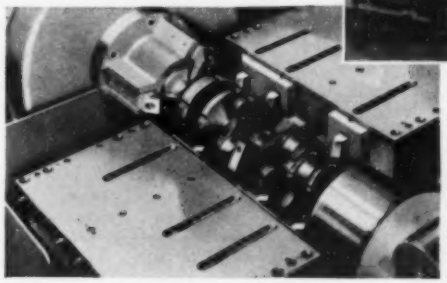
The 25½" crankshaft is held in a special pot-type chuck and driven from a slot in the flange. The oil seal bearing surface rests in a half bearing and is clamped with two jaws. There's a steadyrest at number three main bearing for support. Number one main bearing is held in a tapered, slip-fit bushing in the tailstock.

Three tools each in both the front and rear slides turn all six counterweights and generate chamfers ⅛" by 45 degrees. Floor to floor time is 1.66 minutes, using H. S. S. cutting tools. The sliding tool holders, a precautionary feature for this job, retract into master blocks after cycle is completed, thereby providing loading clearance and tool protection.

JUST OFF THE PRESS!

An entirely new Simplimatic catalog is ready—complete with the information and specifications you want, pictures and job facts. Write today!

The Simplimatic with part ready for loading. Tool blocks at this point are retracted for clearance and tool protection.



Close-up of the workpiece and tooling. Note steadyrest for center main bearing.

GISHOLT

GISHOLT

TIME-SAVING IDEAS

HOW MAINTENANCE BALANCING PAYS FOR ITSELF

Southern Railway Company Adds Life to Diesel-Electric Equipment

Southern Railway Company is doing it, too. In its Pegram Repair Shop, Atlanta, they are getting even greater efficiency and performance from diesel electric locomotives—through balancing. A 6U DYNETRIC Balancer handles balancing in the maintenance of traction motors and generator armatures.

An example is this traction motor armature. Measuring 4 feet long and weighing 2500 lbs., dynamic unbalance is located and measured to an accuracy of ¼ ounce inch. Corrections are made by welding small steel blocks on the core while the armature is still in the balancing machine. A final check for accuracy and possible operator error is then made.

On this large electrical part, the entire operation—setup, loading, checking, correcting, rechecking and unloading—only requires about one hour. Yet, this accuracy of balance—with smoother, vibrationless operation and lessened bearing wear—pays off in far longer life between overhauls, returning balancing costs many times over.

If maintenance of electrical equipment is a problem of yours, ask for the article on balancing applications in railway shops. With it we will include the book *Static and Dynamic Balance*, which thoroughly covers the entire field of balancing.

ALL MATTERS OF BALANCING, *maintenance and production balancing are covered fully in the Gisholt Balancing School. Write for details, starting dates.*

Ready to check and correct unbalance in 2500 lb. armature.

Dial indicates exact number of correction units required.

Precision Balancing of Railway Electrical Equipment Greatly Reduces Frequency of Failure and Assures More Efficient Operation.

DYNETRIC BALANCERS

THE WAY TO BETTER CRANKSHAFTS—SUPERFINISH

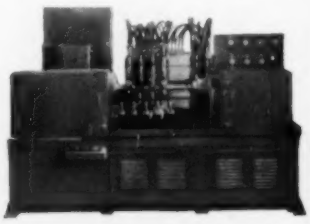
Versatile Machine Handles Variety of Sizes

Even on diesel engine crankshafts, Superfinishing is a quick, inexpensive process.

This Superfinisher is a Model 77, arranged to do both pin and main bearings on a variety of 4 and 6 throw crankshafts. Four sets of stones in each of the upper stoneholder assemblies handle the pin bearings. Lower assemblies each have two sets of stones for the main bearings.

Crankshafts come to the Superfinisher with rough ground bearing surfaces of 20-30 micro inches. After a 2.3 minute automatic cycle, surfaces measure 4-5 micro inches. What this finer smoothness means in greater crankshaft performance is obvious—grinding chatter marks and smear metal are removed, there's improved geometry, added smoothness and longer bearing life.

See how your own problems can be solved by Superfinishing. Write for your complimentary copy of *"Wear and Surface Finish."*



Model 77 Superfinisher for 4 and 6 throw crankshafts.

Superfinishing These Crankshaft Bearings Not Only Assures Longer Lasting Surfaces, but It Also Cuts Grinding Time and Costs.

Close-up showing upper and lower stoneholder assemblies for Superfinishing pin and main bearing simultaneously.

No. 9-1052

599

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

HARDINGE
ELMIRA, N.Y.

TOOL ROOM LATHE

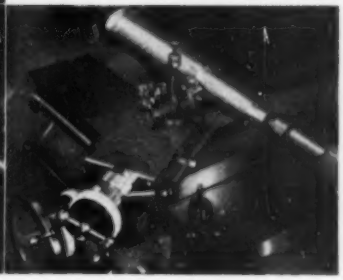
Features QUICK *Feed Change*

Simply TURN KNOB FOR EXACT FEED REQUIRED

CHANGE FEEDS WITHOUT STOPPING SPINDLE OR CHANGING OR SHIFTING GEARS

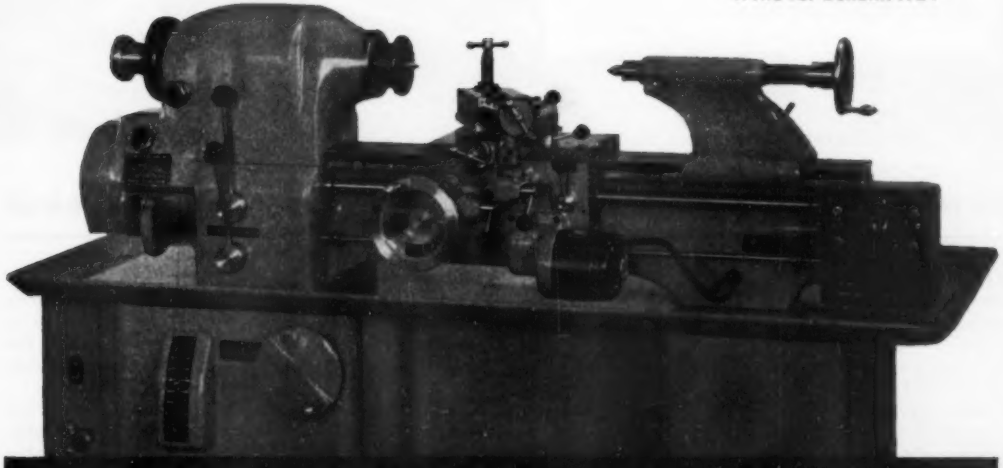
COARSE FEED

MEDIUM FEED



FINE FEED

Write for Bulletin HLV



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

A century of achievement . . .

Studebaker's big, modern South Bend plant symbolizes the century of growth and achievement which have earned for this company an enviable reputation for high quality products and world-wide recognition as America's fourth largest manufacturer of automobiles.

How Standard's lubrication service works for Studebaker

• Look almost anywhere in Studebaker's vast plant at South Bend, Indiana, and you'll see Standard's lubrication service at work.

In one of the many operating departments, the chances are you'll find the Standard lubrication specialist who serves Studebaker. He is assigned to the South Bend area and is close-at-hand to give Studebaker the lubrication engineering assistance they need when they need it.

Almost any day at Studebaker's, you'll see a Standard tank wagon or truck delivering the petroleum products that help keep production rolling. Because these deliveries are made from a nearby Standard warehouse, they are prompt and reliable. Most of the petroleum products used in the Studebaker plant are stocked in this warehouse and are immediately available.

All along Studebaker's assembly and production lines, you'll find Standard Oil products at work. From one of the most complete lines of fuels and lubricants on the market, Studebaker has been able to select the petroleum products that exactly fit its needs.

All of these benefits—expert engineering service, fast and reliable deliveries, a complete line of high quality products—add up to one of the reasons why Studebaker has been a Standard Oil customer for over 50 years. Make Studebaker's experience the basis for putting Standard's lubrication service to work for you. Just phone your local Standard Oil (Ind.) office and ask to have the Standard Oil lubrication specialist in your area call on you.

What's YOUR problem?

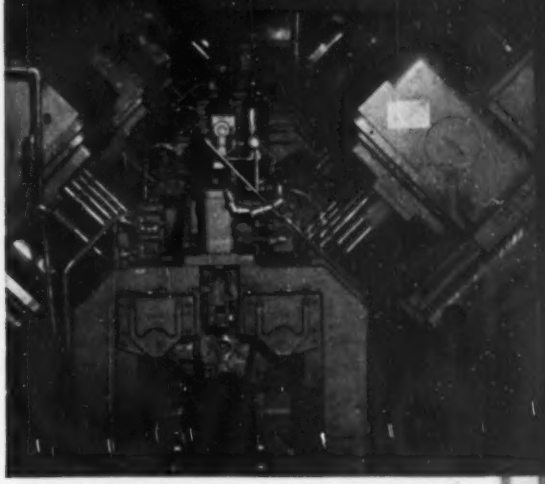
Russ Jenkins (left), lubrication specialist from Standard's South Bend office, and Studebaker's Paul Izdepski work closely together to get best results from Standard's fuels and lubricants.

Wherever your plant is situated in the Midwest, there is a Standard lubrication specialist close-at-hand who will work hand-in-hand with you on lubrication problems. Right in your neighborhood, too, you'll find a Standard office and warehouse. It makes immediately available to you a reliable supply of petroleum products. Phone your local Standard office soon, and find how you can profit through Standard's unique industrial lubrication service.

STANDARD

STANDARD OIL COMPANY
(INDIANA)

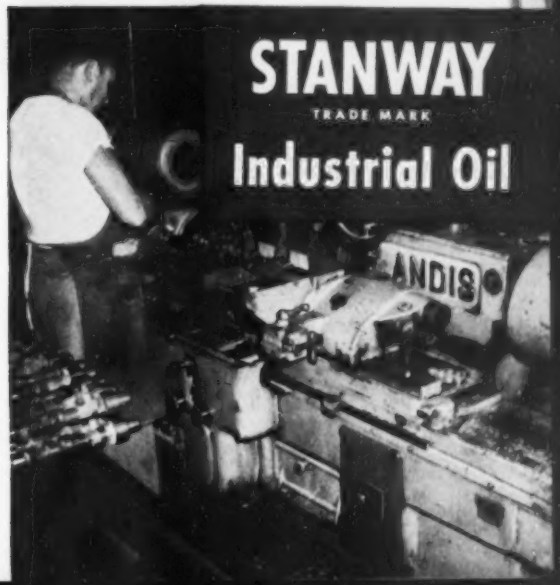
STANOBAR
TRADE MARK
Grease

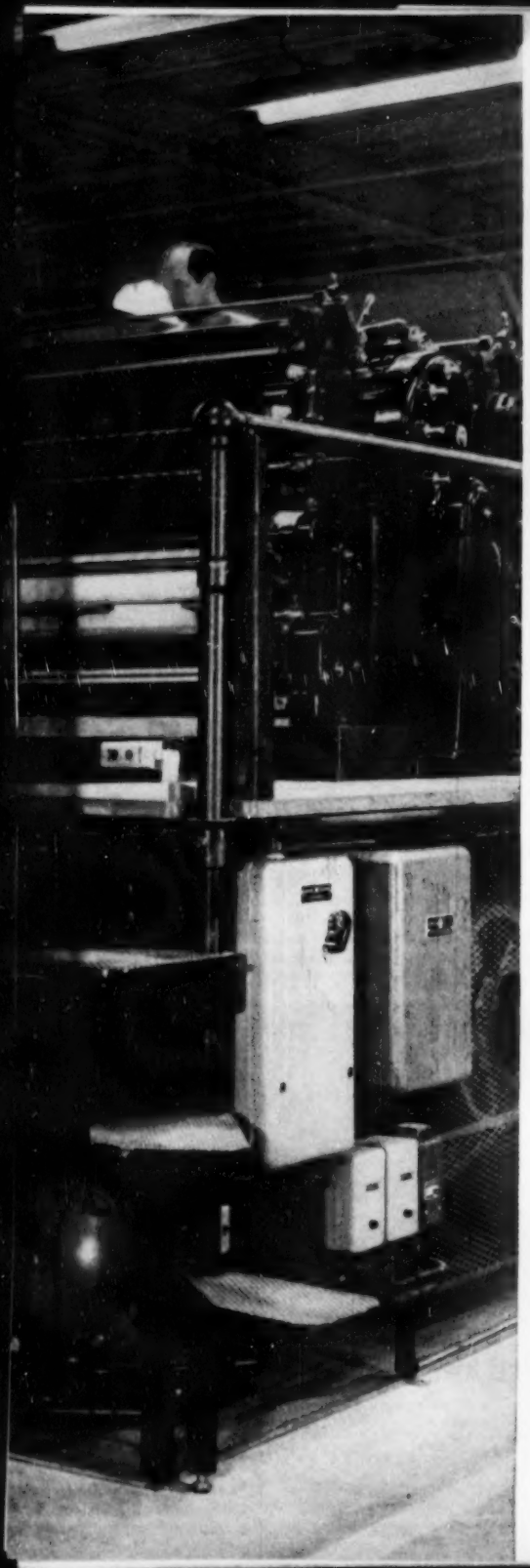


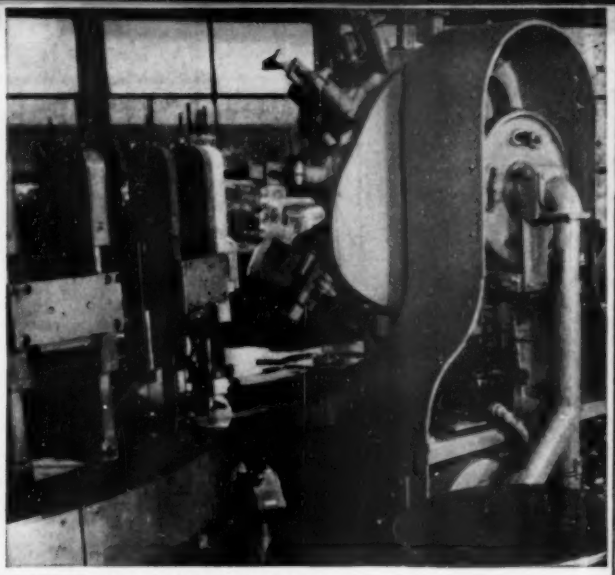
STANOBAR GREASE is used throughout the Studebaker plant for lubrication of bearings in electric motors and oil pumps. Its high stability enables it to provide effective lubrication under a wide variety of operating conditions.

In Studebaker's many grinding machines, such as the one shown below, STANWAY Industrial Oil No. 30H answers a special need by serving both as a hydraulic oil and as a lubricant for ways and guides. The high stability necessary in a hydraulic oil and the oiliness needed in a way lubricant are uniquely combined in STANWAY.

STANWAY
TRADE MARK
Industrial Oil



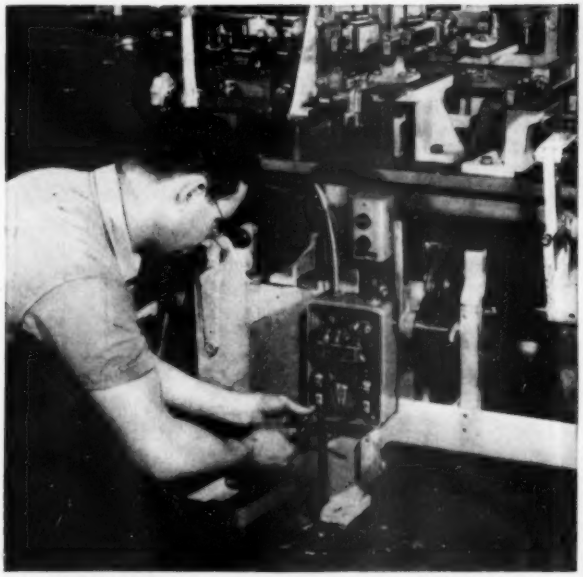




◀ **THE LORD BALTIMORE PRESS,** in their new $2 million plant, chose G-E magnetic starters for long-lasting protection on this huge Harris ITL press. Main drive is controlled by a full-voltage, fuse disconnect, reversing G-E magnetic starter, while two more G-E magnetic starters protect feeder and delivery motors.

Three more leading

"G-E Magnetic



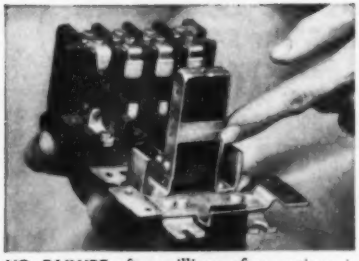
EASY INSTALLATION is another reason companies prefer G-E starters. Here, one is being installed on a Pneumatic Scale Corp. labeling machine. Note accessible wiring terminals all in front.

PNEUMATIC SCALE CORP. LTD. makes complex bottling and packaging machinery. They report that G-E magnetic starters give dependable service, fool-proof motor protection. Above, Pneumatic "bottling line" is being assembled. It cleans, fills, caps and labels—uses G-E magnetic starters to protect its motors.

THE VAN DORN IRON WORKS' Sales Manager J. J. Reichel, pointing to Van Dorn plastic molding machine, says, "G-E magnetic starters are the best long-term assurance we can give customers against motor burn-outs. We've used them on over 1000 machines and never a complaint on electrical equipment."

industrial plants report:

Motor Starters last longer!"



NO FAILURE after millions of operations is assured by exclusive features such as *permanent air gap* in magnet, above. It can't "wear out" because it is independent of striking surfaces . . . prevents "sticking in" of magnetic structure.

EXCLUSIVE STRONGBOX COIL shuts out dust, oil, moisture; can't be damaged by slipping screwdriver—only maintenance tool needed.

The Lord Baltimore Press, Baltimore, Md., the Van Dorn Iron Works, Cleveland, Ohio, and Pneumatic Scale Corp., Ltd; Quincy, Mass. are among the thousands of companies now profitably using G-E Magnetic starters for *longer lasting* protection.

This extra long life is due to many exclusive G-E features, such as the permanent air gap, cold-moulded arc chute, and the famous G-E "Strongbox" Coil. General Electric magnetic starters eliminate metal-to-metal friction, have permanent lubrication, self-cleaning silver contacts . . . everything you need to operate and protect your motors . . . longer.

WIDEST VARIETY: General Electric manufactures the most complete line of motor starters. You have your choice of all popular NEMA sizes in General-purpose, watertight, dust-tight and explosion-proof enclosures. Also, G-E starters are easily modified to meet special requirements.

OFF-THE-SHELF DELIVERY: You can get G-E starters, right now, by contacting your nearest G-E Apparatus Sales office or authorized distributor. For more information, send coupon today. *General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

Section M730-37, General Electric Co., Schenectady 5, N. Y.

Send me your new bulletin GEA-5781 on G-E magnetic and manual starters, and control accessories ☐ for planning an immediate project ☐ for information only.

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, *with proper grinding wheels, can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¼ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ±.0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.

"PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS, SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER"

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

CARBON TOOL STEEL— Toolmakers' First Choice

So many tool steels have been developed for special applications that some people overlook the many uses for carbon tool steels. Actually they're used in larger quantities than any other type of tool steel. An experienced toolmaker usually considers them first, recognizing that they are the logical steels for a starting point.

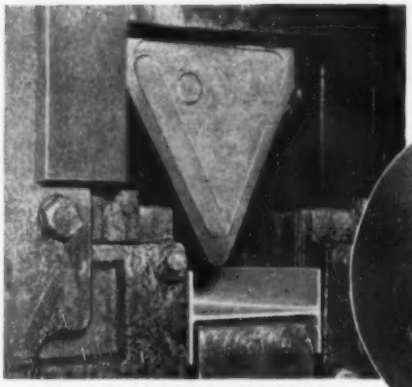
Here's why carbon tool steels are so popular:

- Easiest to machine of all tool steels
- Easy to heat-treat
- High surface hardness reinforced by a tough core
- They develop keen cutting edges

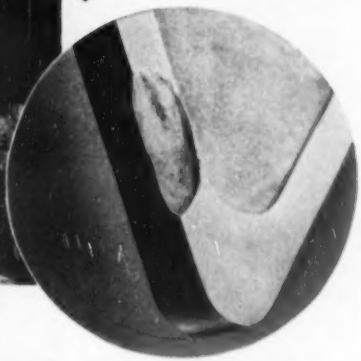
Hand chisels, center punches, and various shock tools are usually made from carbon tool steel having a carbon content of from 0.75 to 0.85 pct. Other ranges of carbon content: 0.90 to 1.00 for cold-heading dies; 1.00 to 1.10 for general-purpose tools and dies (this is the most frequently used analysis); and 1.15 to 1.25 carbon for stone-dressing tools, drawing dies, etc. Our carbon-vanadium steels, containing an addition of 0.15 to 0.25 pct vanadium, have similar applications in many instances.

The controlled hardenability and spheroidized structure of all Bethlehem carbon and carbon-vanadium grades assure uniform response in heat-treatment. Our extensive metallurgical research has established the ideal degree of hardenability for a wide range of applications. Your nearest Bethlehem distributor and our mill depot are at your service when you need top-quality carbon tool steel.

It's easy to machine this chamfering tool holder because all Bethlehem carbon tool steels are carefully spheroidize-annealed to provide a structure that's ideal for easy machining, easy heat-treatment.



The edge of this shear blade chipped because of misalignment which allowed it to strike the bottom blade. Heat-checking, caused by unexpected high temperatures, is also to blame for such failures.



After the triangular blade descends and shears a coupon from the web of the steel beam, it moves first to the left and then to the right to shear off the flanges. The lower knife is not visible.

When cold cuts make hot blades

The shear blades usually lasted about one week in a fabricating shop where steel beams and channels were cut in large quantities. Bad spalls on the cutting edges made it necessary to change blades about once a week, and it was taken for granted that little could be done to make them last longer.

One of our metallurgical men learned of this while in the shop on another job. He began to investigate and soon found that the "cold" cutting was generating about 700 F on the blades. This caused the tool steel to develop heat-checks. In addition, the blade was overloaded due to poor alignment which allowed it to strike the bottom blade. The combination of heat and overload explained the poor service life.

The solution: Hot-Work 8, one of our hot-work steels, was tried. It's an 8-pct molybdenum analysis that's tops in wear-resistance when operating temperatures are high. Tempered at 750 F, the first blade made a total of 45,000 cuts. The best previous record was 7,700 cuts.

Here's another instance of how the practical experience of our metallurgical contact men helps to put the finger on tool steel troubles.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Heat-treat the tool, not the thermocouple

Improper temperatures during heat-treating frequently cause tool failures. In many instances the thermocouple chart shows proper heat-treatment temperatures, but the microstructure of the tool proves that the temperatures recorded were not attained by the tool. This is known as "heat-treating the thermocouple instead of the tool."

Most furnaces show some non-uniformity of temperature — locations near the source of heat are hotter than remote locations and the bottom tends to be colder than the top. A survey of each furnace will reveal the temperature differences which are present. This information makes it possible for the operator to select the location which will indicate most accurately the temperature of tools heated in the furnace; quite often the need for more than one thermocouple is apparent.

A thermocouple indicates the temperature of its tip only, so it's good practice to place the tip of the thermocouple as near to the tools as possible. Locations near the floor, sides, roof, or near the source of heat should be avoided. The thermocouple is an accurate and highly useful device, but it's not foolproof.

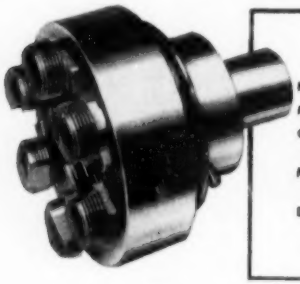
NAMCO VERS-O-TOOLS and COLLAPSIBLE TAPS

SET THE STANDARD

for continuous, high production on rocket tube threading

On this rocket job these Namco threading tools outperformed any other method—in time-saving, in sustained quality and in trouble-free operation. The procedures we helped work out for the first pilot installation have since been *adopted as standard at ten other plants contracting for the same job.*

Regardless of the type of threading work you are doing, may we show you how the same basic principle can be applied to save you time, money and materials—with Namco Vers-O-Tools and Collapsible Taps?



JOB FACTS

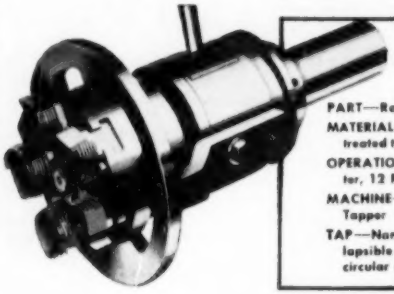
PART—Rocket Nozzle

MATERIAL—X 1117 Steel

OPERATION—Thread 4¾" Diameter, 12 Pitch, Class 2 Fit

MACHINE—W. F. and John Barnes Drill

DIEHEAD—Namco Type DR 4⅞" Vers-O-Tool with 6 ground thread circular chasers



JOB FACTS

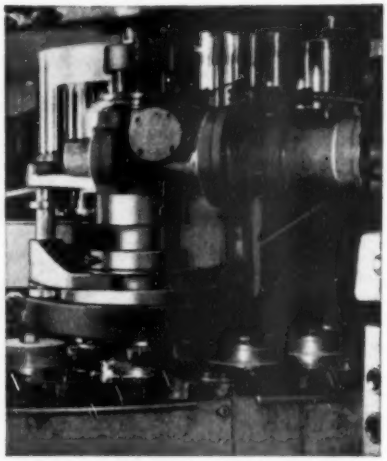
PART—Rocket Motor Tube

MATERIAL—NEA-8620 Steel, heat-treated to Rockwell C-28-30

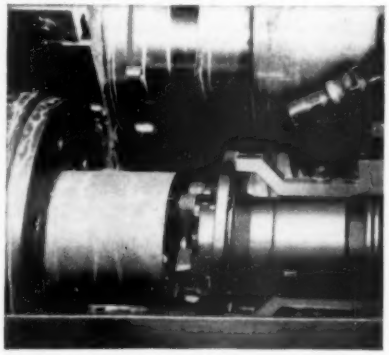
OPERATION—Tap 4¾" Diameter, 12 Pitch, Class 2 Fit

MACHINE—Lehman Double-End Tapper

TAP—Namco Type RST 5" Collapsible with 5 ground-thread circular chasers.



Namco Type DR Vers-O-Tool Die Head threading rocket nozzles on a W. F. and John Barnes Drill—Firestone Steel Products Division Plant, Akron, Ohio



Namco Type RST Collapsible Tap tapping rocket motor tube on Lehman Double End Tapper—Firestone Steel Products Division Plant, Akron, Ohio

ASK FOR NEW CATALOG DT-52 . . .

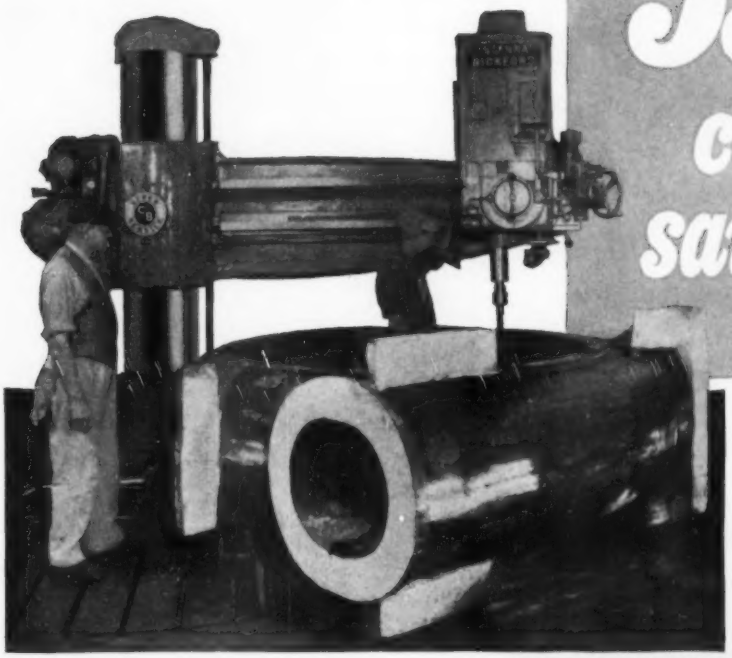
for complete information on Namco Vers-O-Tools and Namco Collapsible Taps, available with ground thread precision chasers.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

This BICKFORD effected a 35% cost saving!

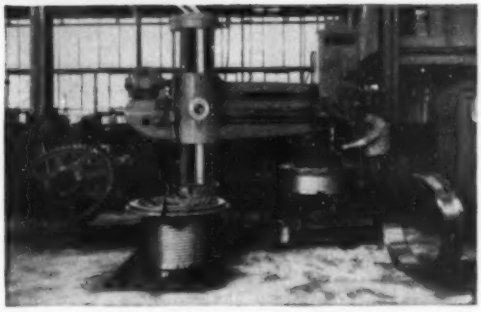


Drilling large centrifical dredge pump housing. This 7 arm, 19" diameter column Cincinnati Bickford Super Service, equipped with triple base, allows setup of two jobs while the third is in process.

The efficient drilling department at the National Supply Company of California effected a 35% cost reduction in drilling operations with this Cincinnati Bickford Super Service Radial Drill.

Here the many feeds and speeds of the Cincinnati Bickford Super Service Radial Drills—and their rigid construction—combined with their easy operation—handle a variety of heavy duty jobs with outstanding dependability at low costs.

Write for Booklet R-29 on these powerful, accurate Cincinnati Bickford Super Service Radial Drills.



Drilling and tapping a clutch housing. Note the second housing ready for drilling on one of the triple bases of the machine. No time lost in setup.

Photos—Courtesy of National Supply Co., Torrance, Calif.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio U.S.A.

This ad....

Help Wanted

COMPANY to design and build shell loading hydraulic presses. Must be fast, efficient and engineered for safety. World War II experience preferred.

DESIGN... tool designers, draftsmen, ... established manufacturer...

FITS KRW
to a.....

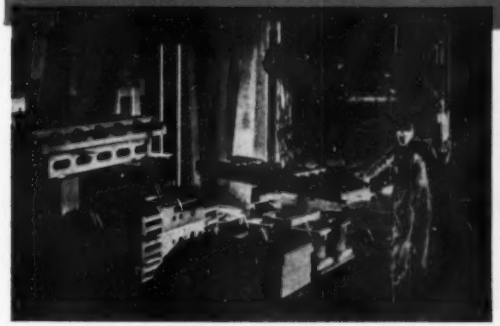
If we saw the above ad in tonight's paper, we'd reach for the phone . . . quick! The job's made to order for K. R. Wilson. During World War II, KRW engineers designed a faster and safer method for loading shells and incendiary bombs. Hundreds of KRW 1-station, 2-station and 4-station shell loading presses were supplied to bomb loading contractors across the country. The photo at left above shows a close-up of the shell case holder on a KRW 4-station shell loader. At right is a battery of KRW presses working at top speed in one of the nation's largest arsenals.

K. R. Wilson is set to do an even bigger job today. Almost two million dollars in new machinery and equipment have been added to our plant since World War II. So if you have shell-loading contracts, write, wire or phone KRW for the right equipment. We can go to work on your order at a moment's notice.

Send for
FREE NEW BOOKLET
It tells all about our plant, equipment, facilities and experience in war and peacetime production. It's yours for the asking. Write Dept. H.

K R WILSON
215 Main St. • Buffalo 3, N. Y.

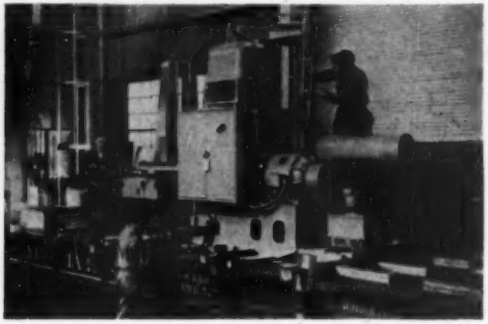
"Where's the LUCAS we need so badly?"



The ultra modern Lucas plant is being used to full capacity with work in process and rough castings waiting to be machined.

Lucas machines at work making components for more Lucas machines, in our plant and in the shops of many outside suppliers.

Still no sacrifice of Lucas standards. Ultra modern production methods, but still the skilled hand craftsmanship for which there's no satisfactory substitute.



More shipments than ever, but, of course, defense priorities dictate who gets what. Perhaps this is the machine we originally scheduled for you.

Your inquiry and your order are as welcome as ever at Lucas. Today's conditions won't last forever and your Lucas Horizontal Boring, Milling and Drilling machine will always be a time saving money maker.

THE NEW BRITAIN MACHINE COMPANY — LUCAS — CLEVELAND

LUCAS *Precision*

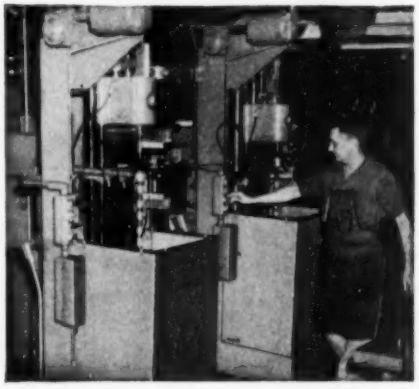
HORIZONTAL BORING DRILLING AND MILLING MACHINES

LUCAS MACHINE DIVISION • THE NEW BRITAIN MACHINE CO. • CLEVELAND 8, OHIO

WHICH OF THESE HEAT-TREATING PROBLEMS IS YOURS?

Cost Reduction?
Increased Production Rates?
Quality Control?
Reducing Distortion?
Production-Line Heating?
Floor Space?

Westinghouse induction heating helped Saco-Lowell solve all six



Saco-Lowell Shops, makers of outstanding textile machinery, had always experienced problems with hardened bottom front rolls.

A Westinghouse 50 KW-450 KC RF Generator, with two standard vertical scanners, helped increase line production rates by 145% with total annual savings of $18,800.00. Direct labor costs have been cut 63%. Journal bearings are now ground after hardening, producing a higher quality roll. Formerly, every shaft required straightening; now this operation has been simplified and costs are reduced 70%.

Look at the results obtained by Saco-Lowell with a Westinghouse process that can handle 432 different rolls. Examine your heat treating problems. They, too, may be reduced, clarified, or eliminated entirely.

J-02343

Westinghouse Electric Corporation
Department M-47
2519 Wilkens Avenue • Baltimore 3, Maryland

Send me your informative case history booklet on induction heating.

Name .....
Company .....
Street .....
City ..... Zone ..... State .....

YOU CAN BE SURE... IF IT'S

Westinghouse

INDUCTION HEATING

The New Day's Dawning!

Plant Expansion Plant Modernization

A Progress Report on Monarch's Improved Lathe Production

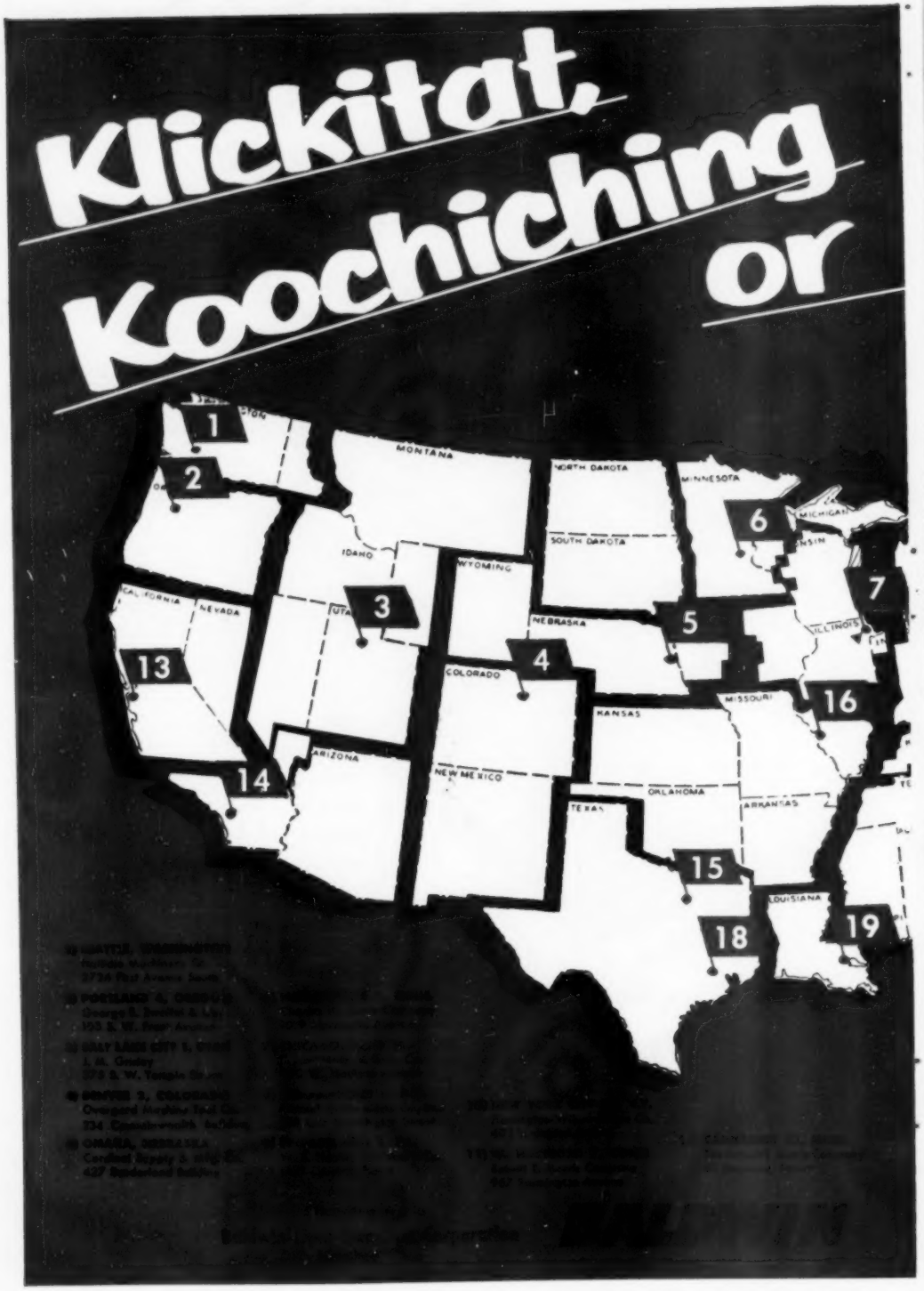
Your Monarch lathe order may be closer to delivery than you think! Very soon, now, our expansion program will be completed—and every day output increases as we move new tools and production lines into each unit on the heels of construction crews.

Monarch output for '52 will be about double that of '51, and the architect's rendering above largely explains this growth. Upon completion of our program, we will have added a whopping 43% to our floor space since the close of World War II, and completely modernized the 25% requiring it. Tool and equipment additions, of course, are in proportion. With a completely modernized plant plus this great an increase in floor space, you can see why we're confident of cutting into our backlog fast.

Every day, we're better able to handle new orders and to move faster on present orders—and there'll be continuous improvement with each day's operation. So hang on to your precious priority order. Let us have your new orders. Your new Monarchs are getting a lot closer than they were. . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE

FOR A GOOD TURN FASTER . . . TURN TO MONARCH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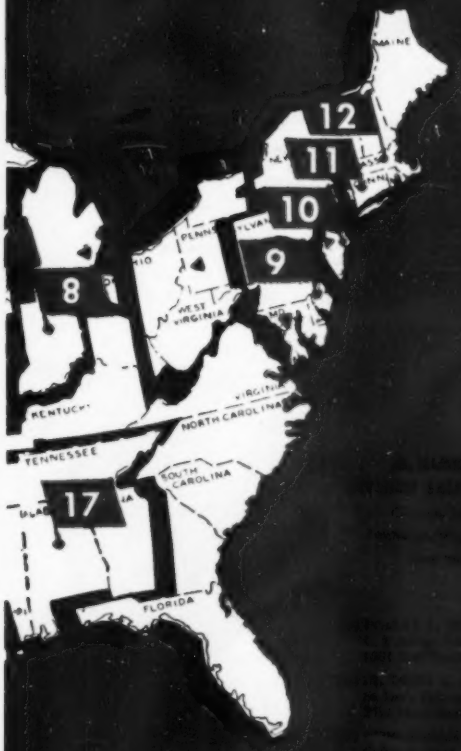
Sagadahoc*

u are we are



When you buy Niles machine tools—*the brute force machines with the precision touch*—you've made a big investment. So we want you to take full advantage of the unusual efficiencies that are built into them.

To help you, we've located an exclusive Niles distributor conveniently near your plant . . . no matter where it may be.

Call on him. He has trained men who can show you how to get maximum efficiency from your Niles tools—give you help in planning machining operations—give you sound advice on rearranging operations for better production flow. And, if there ever is a breakdown, he has a good supply of parts—plus special training on how to get your machine back in service *fast.*

If you have *any problems in precision machining* of big parts or many parts at once, you'll find he's a good fellow to know.

* **Counties in Washington, Minnesota and Maine, respectively.**

TON

BALDWIN · BLH · LIMA-HAMILTON

It will pay you to review

Production Increased 89.7%

Grade: MX
Cold drawn size: 5/8" Rd.
Part Name: Camera coil case for flash gun
Machine: New Britain
Operations: Spot and form, drill 27/64", drill 27/64", ream and shave, thread, cut-off
Cutting Media: HS Steel and Allube Nu-Sol No. 2

Comparative production:

Grade	SFM	Seconds per part	Parts per Hour	Production increase
B-1113	110 Turn 35 thread	11.3	319	.....
MX	230 Turn 70 thread	6.0	605	89.7%

Production could have been improved except threading operation governed production.
(Material cold drawn by Bliss & Laughlin, Inc.)

Production Increased 41%

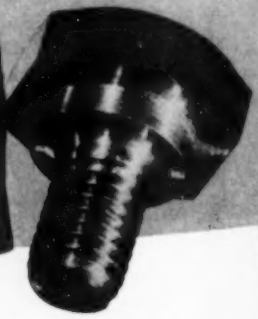
Grade: MX
Cold drawn size: 1½" diameter
Part Name: Hub
Machine: Brown & Sharpe No. OG
Operations: Center drill, drill, ream, front slide form, back slides cut-off

Comparative Production:

Grade	SFM	Seconds per part	Parts per hour	Production increase	Tool life hours
B-1113	225	12	300	.....	Same for both
MX	298	8.5	423	41%	

(Material cold drawn by Bliss & Laughlin, Inc.)

Production Increased 33.5%



Grade: MX
Cold drawn size: 1¼" Hexagon
Part Name: Bearing stud bolt
Machine: Model 61, 1⅝" New Britain, 6-spindle
Operations: Rough and breakdown knee turner, finish knee turning, face off, finish form, hollow mill, thread, breaking down cut-off, cutting off
Cutting Media: Shell Fenella #921 (Sulphurized)

Comparative Production:

Grade	SFM	Seconds per part	Parts per hour	Production increase	Tool life Parts	Tool life increase
B-1113	200	20	179	.....	716	.....
MX	250	15	239	33.5%	1912	167%

All MX parts have superior finish. Tools ground only half as often with MX
(Material cold drawn by Bliss & Laughlin, Inc.)

Production Increased 27%

Grade: MX
Cold drawn size: 1⅜" Rd.
Part Name: Pulley
Machine: Brown & Sharpe, G-2
Operations: Center drill, recess and drill, tap ⅝", thread, form, face and cut-off. (Feeds increased with MX)
Cutting Media: Socony Vacuum General Purpose oil, plus 3% sulphurized. Filtered and cooled to 50°.

Comparative production:

Grade	SFM	Seconds per part	Parts per hour	Production increase
B-1113	245	35	103	.....
MX	312	27.5	131	27%

Tool life with MX was equal or superior to B-1113. High quality finish maintained.
(Material cold drawn by Bliss & Laughlin, Inc.)

steel "specs" set up years ago ...now that costs can be cut with MX

today's freer-cutting screw stock!

THE old ways are not always the best ways. Now that U·S·S Free-Machining MX has been developed, the performance of those older specifications for screw machine stock, that you've continued to follow without question on repeat orders, should be carefully re-examined.

For with this new freer-cutting MX screw stock, your screw machine parts, no matter how intricate, can be turned out faster and with less tool wear than when produced with ordinary Bessemer screw stock.

These are facts. In hundreds of shops that have used MX in producing millions of parts of many different kinds, the story is always the same. MX has shown that it will boost hourly output, lengthen the interval between tool changes, will produce more accurate parts and improve part finish. In every instance where MX has been given a thorough trial, cost savings have been recorded.

These cost savings with MX have run as high as 42%—usually the figure runs around 10 to 15%. We feel safe in saying that MX will cut the cost of *any* part you now machine from ordinary Bessemer screw stock—even though MX costs a fraction of a cent more per pound.

Switch to MX. Give it a thorough trial and watch your production go up and your costs go down.

U·S·S Free-Machining MX is being produced in all the popular screw stock sizes. It is sold in cold-finished form by your regular supplier as "MX" or under his own identifying trade name. In hot-rolled form MX is available direct through our nearest district sales office.

NOW, when production is more important than ever—speed up the job with MX

USS

UNITED STATES STEEL COMPANY, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

3-406

UNITED STATES STEEL

Do you really know you couldn't do

Only **CARBO** TRADE

it faster with an abrasive DISC?

A healthy skepticism is the profitable approach for you to take, nowadays, to every abrasive operation in your shop. The difference between a bad and a good profit factor can often be a new improvement in grinding, and new developments in this field are piling up daily under the crucial necessity of cutting costs without cutting corners.

If there's a faster, better way to perform any grinding or polishing operation, your CARBORUNDUM or distributor salesman is one man who's sure to know about it. Through him, and with his unbiased help, you can change your operating methods, if that seems indicated. Or you can change the abrasive you're using. Or both, or neither. The point is...both you and he are operating on *your* side of the desk—primarily for your profit, incidentally for his.. not the other way round.

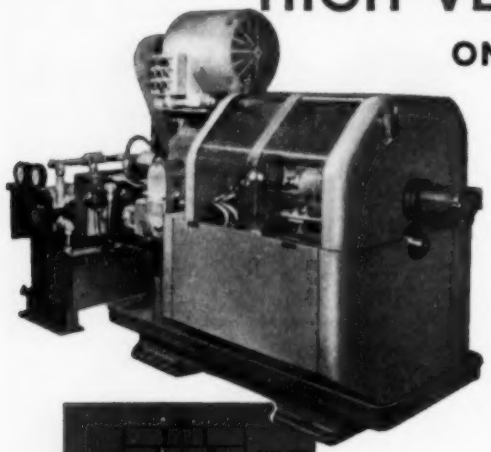
That's what comes of working with the man who represents the only complete line of branded abrasives, unsurpassed in scope, unexcelled in quality. So, today—call in the man from CARBORUNDUM: it's to your profit!

Here are only a few of the 30,000 reasons why you get the RIGHT combination of abrasive and method only from CARBORUNDUM

RUNDUM
MARK

offers ALL abrasive products...to give you the proper ONE

AUTOMATICITY BACKS UP HIGH VELOCITY TURNING ON FAY AUTOMATICS



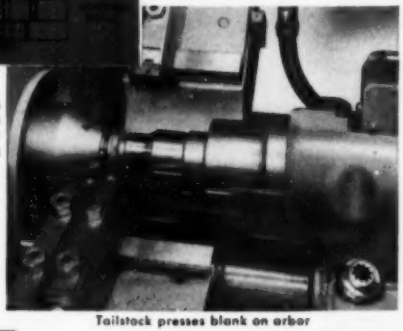
FIRST OPERATION: Note intricate movements of the carriage, which turns the hub, back angle and major diameter. The back arm faces and forms.

SIDE GEARS
18 Seconds Floor to Floor — 635 SFM

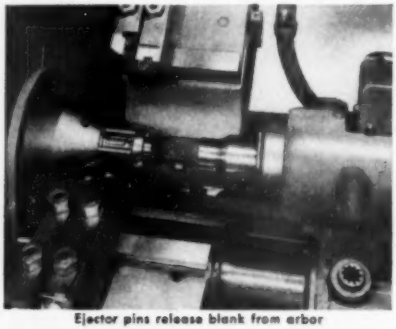
Two 8" Fays, with Automatic Sequential Control, machine all exterior surfaces of the blanks in two operations; one machine for each. The major diameter is 2-15/16" and floor to floor time is approximately 18 seconds in each operation.

Automatic Cycle—The machines are equipped with automatically operated splash guards and automatically air-operated tailstock rams for pressing the blank onto a splined arbor equipped with automatically operated ejector pins.

The operator places the blank on the end of the arbor, and pushes the cycle start button. *Automatically, the guard closes, the tailstock ram presses the piece onto the arbor and then retracts. The carriage turns, the back arm faces, and at the end of the cuts, ejector pins push the piece onto the loading section of the arbor* from which it is removed manually.



Tailstock presses blank on arbor



Ejector pins release blank from arbor

Production management regularly relies upon the engineering services of Jones & Lamson for the latest information on methods, costs, tooling and performance. Why not consult us about YOUR *turning, threading and inspection problems.*

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. Dept. 710

FAY LATHE DIVISION

for Lower Costs!

Take a tip from hundreds of plants all over the country. Stop using old-fashioned cutting fluids. Go Cimcool®, the radically new and different cutting fluid that does a better job and saves you money in three important ways:

- CIMCOOL INCREASES TOOL LIFE (and thus reduces down time) because of its chemical lubricity.
- FASTER SPEEDS are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.
- CIMCOOL COSTS LESS than old-fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. And because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

For a demonstration in one of your own machines, just write us. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

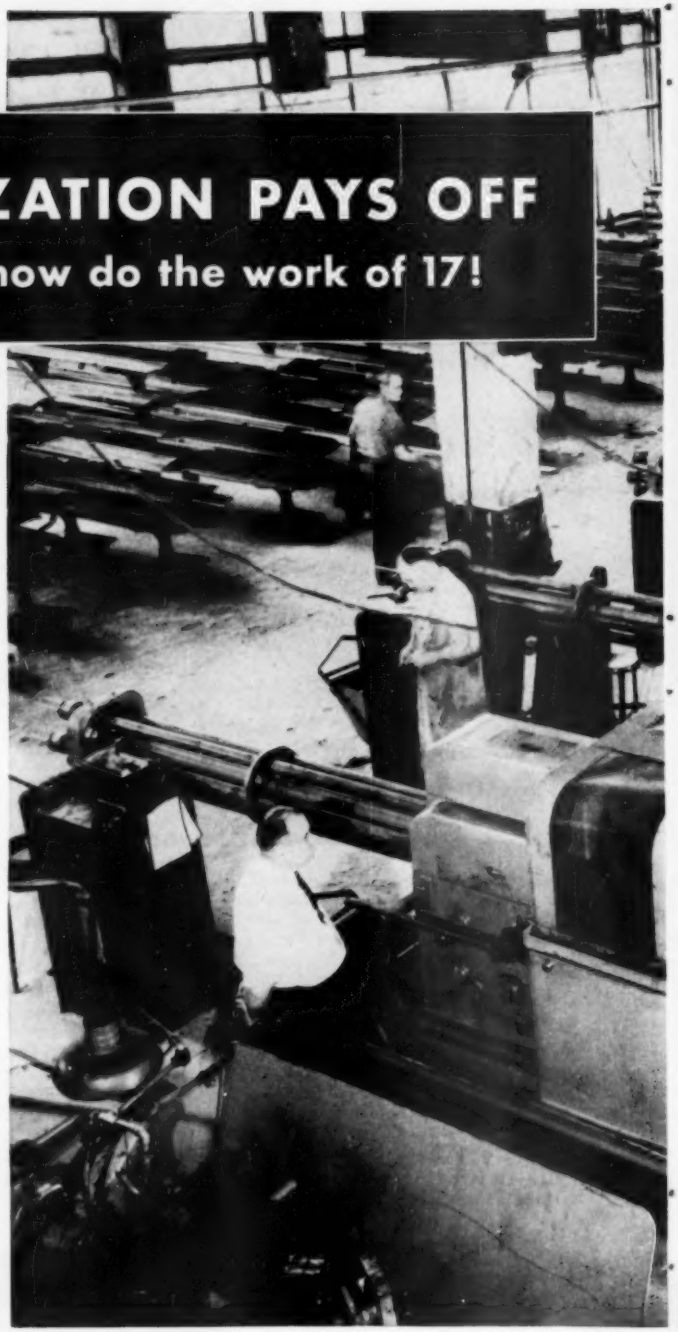
®Trade Mark Reg. U.S. Pat. Off.

A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.

for 85% OF ALL METAL CUTTING JOBS

MODERNIZATION PAYS OFF

6 machines now do the work of 17!



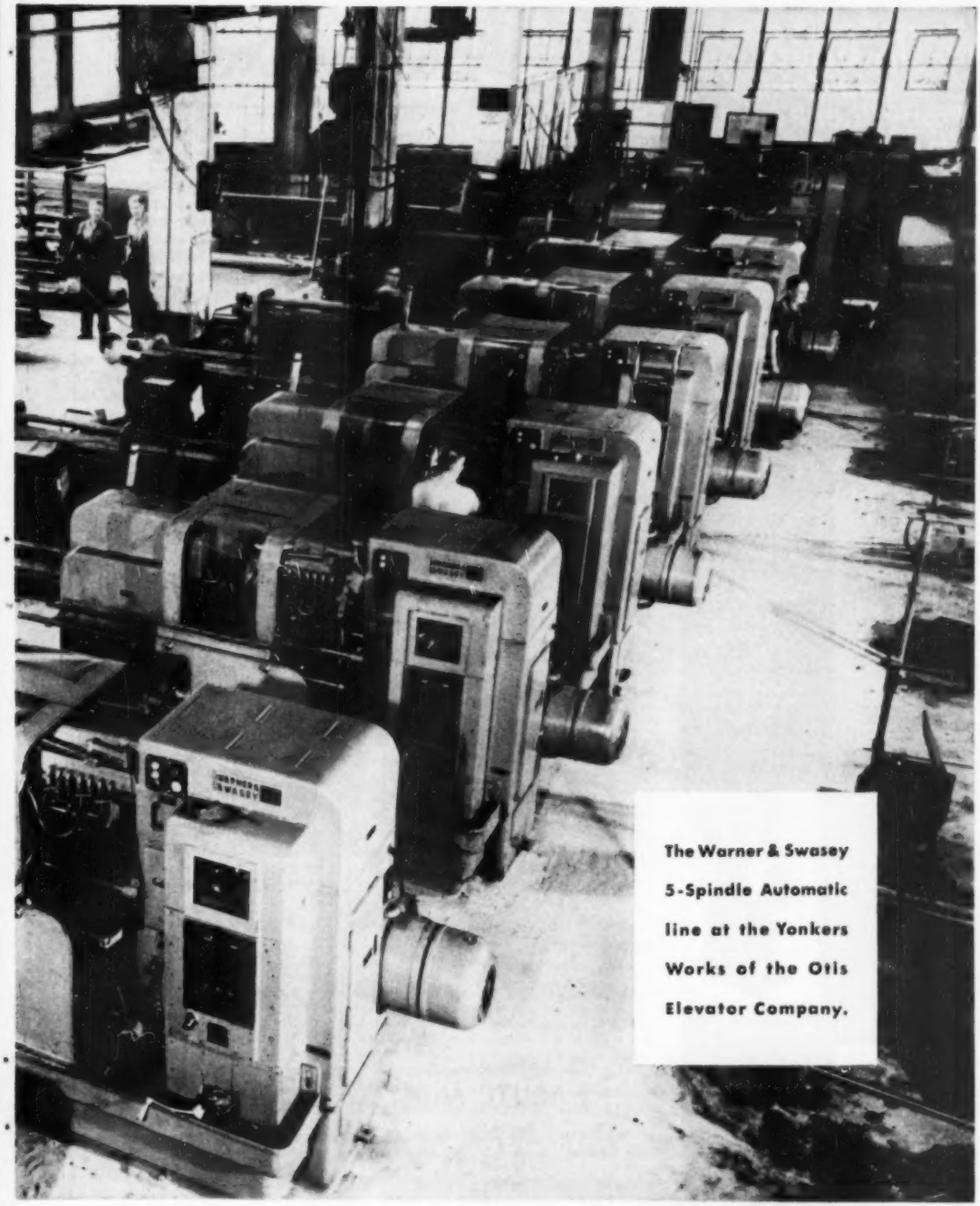
• As part of their modernization program, Otis Elevator Company replaced 17 machines with 6 Warner & Swasey 5-spindle Automatics. These automatics are used at Otis for short runs on specially-machined parts—studs, bolts, nuts and other screw machine products—required for custom-made elevators.

The results of this modernization program: increased production in less floor space, more uniform parts, and six critically needed men released for work elsewhere in the plant. At Otis only 3 men are required to set up and operate these 6 automatics.

Because of its quick setup and ease of operation, the Warner & Swasey 5-spindle Automatic makes automatic production economical on short runs as well as large lots. It's a machine designed to meet the requirements for lasting accuracy and increased production for the years ahead.

WARNER & SWASEY
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER



The Warner & Swasey 5-Spindle Automatic line at the Yonkers Works of the Otis Elevator Company.

& SWASEY TURRET LATHES, AUTOMATICS, AND TAPPING MACHINES

Keep Your on the OLIVER Line
— Cost Cutting
Production Boosting
MACHINE TOOLS

OLIVER
DRILL POINTERS

Precisely machine ground drills give better, performance. OLIVER Drill Pointers with each lip doing equal work give fastest cuts—more accuracy—more perfect holes—more efficiency—longer drill life.

As Illustrated:

No. 21 Oliver Bench Drill Grinder. Hand operated for Drills No. 57 to ½".

No. 510 For Drills ¼ to 3—2-3-4 flute

OLIVER DIE MAKING MACHINES

Efficient, speedy and accurate — effecting great savings in time and costs. Skilled labor is not required for sawing, filing and lapping operations.

Available in 5 Models

Bench Model (5-1 illustrated) — Single Speed Die Maker for use on Tool Steel up to 1" Thick.

Heavy Duty Model (Illustrated) — 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

OLIVER ACE UNIVERSAL
TOOL & CUTTER GRINDERS

Keep your most difficult cutters sharp with Oliver ACES. They excel on high speed and Tungsten Carbide work. Direct reading for clearances reduces fatigue — eases operators' jobs.

The ACE excels for grinding face mills up to 15" also slab mills • slitting saws • all types cutters and reamers.

2 Models: Heavy Duty (Illustrated) and Standard.

OLIVER 20" TEMPLATE
TOOL BIT GRINDER

Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1½" wide x 13/8" high from 0 to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten Carbide and high speed tools. It offers increased production, lower tool costs and savings in man hours. Extremely fine finish assured.

Write Today for Complete Information

OLIVER INSTRUMENT CO.
1418 E. MAUMEE • ADRIAN, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Record Holder?

I have been wondering if there is any other living reader who read the first edition of AMERICAN MACHINIST, as I did. I am 88 years old, but could pass for 60 or 65, and have no ailments of any kind. Some years ago, I wrote an article on cams which, later, was published in book form.

I retired 10 years ago, but did some work until 3 years ago which took me out to Minnesota for a while. Now I go every day to Seaside Park to meet old friends, all over 70, who have been in the mechanical line.

Chas F Smith, ME
Bridgeport, Conn

We have had letters from several old-time readers, but we believe Mr Smith rates as our oldest. Can any other reader match this record?—Ed.

Pardon Us

I have just received the tear sheet of my idea on "Wide Index-Plate Finger Compensates for Cutter Width" (*AM*—July 7 '52 p159), and note an error in the copy. Someone has substituted *diameter* of work for *radius* of work in the simple proportion, making the proportion unworkable, and making me look like a dope. The original material I sent you read: Width of pointer equals dia of cutter times radius of index plate, divided by radius of work.

Robert Roedder
Wayne, Pa.

This was our error, and should not be chalked up against Mr Roedder. Don't know how it happened, but there it is. Please accept our apologies.—Ed.

Nothing New

It was interesting to read how roller saddles were machined on a vertical boring mill (*AM*—June 23 '52 p123). It looked like a duplicate of our old 12-ft vertical boring mill which we used in practically the same way to machine the stator frames for the

BY D. G. SMITH

GRINETICS

ACUTE ANGLE

VACUUM CLEANER

ALUMINIZE

Republication rights reserved

.0001" ACCURACY

THE DRESSER WITH A MICROMETER FEED

J & S "Fluidmotion"* Radius and Angle Dressers

Dress Two Angles Tangent to a radius in ONE CONTINUOUS MOTION

ELIMINATE GAGE BLOCK—MASTER GAGE SETTING—JO BLOCK—PARALLEL BAR—SURFACE PLATE—HEIGHT GAGE—DIAL INDICATOR—CHATTER MARKS OR TOOL MARKS AND COSTLY MAJOR REPAIRS.

WITH J & S "Fluidmotion," it is not necessary to preset the diamond, all that is needed is a micrometer and a simple hex wrench.

SETTING UP is easily done right on the surface or cylindrical grinders.

TOOL GRINDERS are at a premium—by employing J & S "Fluidmotion" you can very easily develop top notch tool grinders.

WE STATE and can back up—of the last 2000 "Fluidmotion" Radii & Angle Wheel Dressers sold in the last 10 years—LESS THAN 1% HAVE BEEN RETURNED FOR SERVICING and NONE DUE TO WEAR. The average cost for servicing is approximately $4.00 per year, over a 5-year period.

BECAUSE "Fluidmotion" is made from the finest HIGH-CARBON, HIGH-CHROME, hardened, ground and lapped alloy steels, highly resistant to abrasive action.

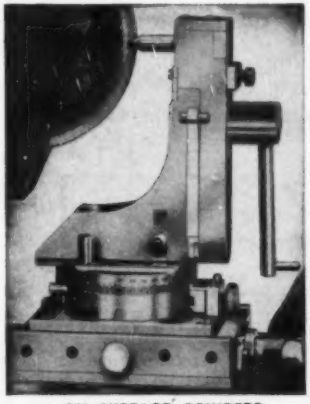
GIBS & V-WAYS are positioning surfaces only for dressing angles which eliminates the conventional method of movements on dovetails which also is always exposed to grit and coolants.

RADII precise sharp contours, concave or convex, at a full 180°, are obtained consistently with (GUARANTEED) 0.0001" accuracy.

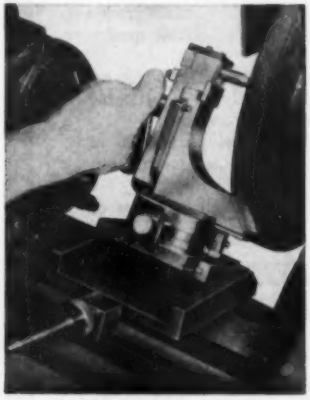
CONCAVE RANGE—1/32" to 3 inches
CONVEX RANGE—zero to 8 inches

Special dressing equipment can be furnished to dress wheels up to 36" in diameter. Dresser swivels on Stainless Steel Ball Bearings which are completely protected from dust.

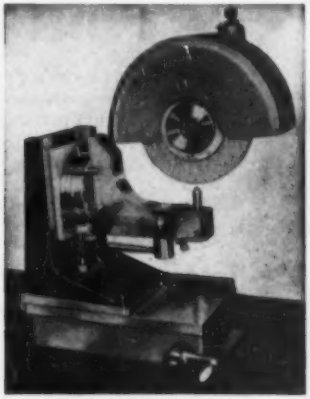
ANGLES Hold intersecting angles 12 to 15 seconds, THIS is actuated by upright and handle. Setting up two angles requires 10 seconds. Setting two angles and radius requires less than 3 minutes.



ON SURFACE GRINDERS
MODEL "C" SHOWN



UP TO 36" DIA. WHEELS
ON CYLINDRICAL GRINDERS



MODEL "H-24" up to 24" wheel
MODEL "H-36" up to 36" wheel

HEIGHT OF DIAMOND POINT FROM TABLE IS AS FOLLOWS:
J & S "FLUIDMOTION" SERIES

Model "C" up to 14" dia. wheel—with micrometer feed is 8⅝" above table.
Model "E" up to 14" dia. wheel—without micrometer feed is 7½" above table.
Model "FG" up to 7" dia. wheel—with micrometer feed is 6⅛" above table.
Model "F" up to 6" dia. wheel—without micrometer feed is 5" above table.
Model "HC" up to 36" dia. wheel—with micrometer feed is 15¼" above table.
Model "H" up to 36" dia. wheel—without micrometer feed is 14" above table.

For shops having less frequent wheel dressing requirements our less expensive "Form Master" Radius & Angle Wheel Dresser is available. Wheel capacity, up to 10" and diamond is 7¼" above table.

***DELIVERY* for month of September on above Models:**
3 WEEKS AFTER RECEIPT OF ORDER. F.O.B. EAST ORANGE, N. J.

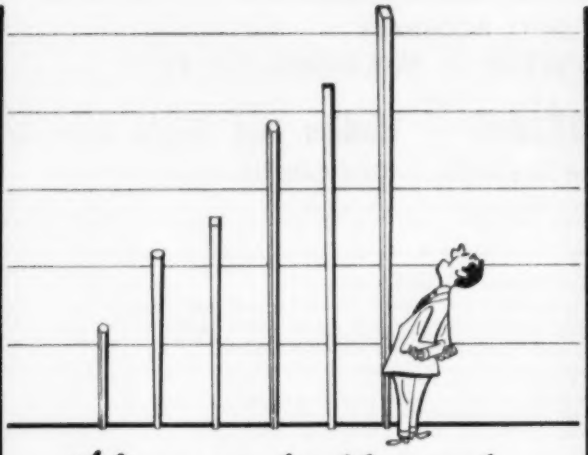
OTHER "Machine Shop TIME SAVERS" by J & S:
J & S "All-Purpose" Jaw Clamps. Special Purpose Form Tools of Solid Carbide—High Speed Steel.

For Details, write to:

J&S TOOL CO., INC.
479 Main Street, East Orange, N. J.
Representatives in Principal Cities

*Reg. U.S. Pat. Off.

OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE ROUNDS SQUARES FLATS HEXAGONS OCTAGONS



BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS

things are looking up!

Yes, steel supplies *are* improving tonnage-wise! Even alloy steels are in better supply. However, the continued scarcity of many alloying materials makes certain grades of alloy steel still unobtainable, and substitute grades must be used.

Chances are, we can supply your needs . . . but if we can't, perhaps we can suggest and supply the substitutes best suited for your particular requirements.

Or possibly we can suggest alternative methods of manufacture, or variations in your present methods of treatment.

Your nearest **W-L** office will be delighted to be of service. Call them today!

Get in the SCRAP! . . . every pound means more steel for you!

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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Niagara Falls generators installed in 1910-11 by Canadian GE.

Stator frames were set on brackets fastened to the base of the mill, squared up by feet, and centralized and clamped to brackets braced to the floor. The crossrail was run away back to clear the casting. A housing to hold the toolpost was clamped to the table, and a starwheel on the end of the screw engaged a roller fastened to a bar on the crossrail to give mechanical feed. The top and bottom of the casting were faced by hand feed.

Dia of the bore was 18 ft, and height about 5 ft. Our pay was 25¢ an hr, but when the job was finished we got a bonus of $90. That was a lot of dinero in those days.

Looks like the same old moon shining, only a lot brighter, because we have everything better today. Then, we were just beginning to cut chips that kept the HSS tool point red all day. It was rather fascinating. We had no carbides then, but lots of enthusiasm.

J H Davidson
Pointe Claire, Quebec

Extra Dividend

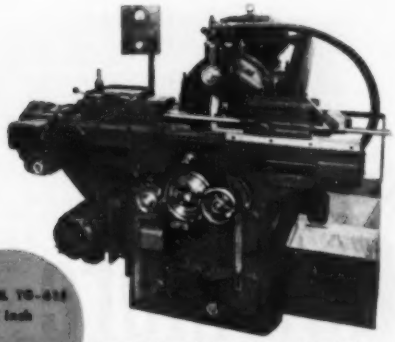
Thank you for the cheque for my article. I had no idea of payment for this sort of thing, so it comes as a pleasant surprise.

It so happens that I have just heard of a piece of apparatus that I have been wanting for years—a spherical slide-rest. These are not too easily come by, and the cheque will come in very useful as a contribution to it, without any comments from the housekeeping side of the establishment. These old slide-rests are something to see—four slides, and a rotary motion, with elevating motion as well.

You might be interested to know that I was asked recently to try to make a small, tricky part. It was a trifle awkward, and I could think of no way of doing the job without a special rig-up. Then, the very next day, the current issue of AMERICAN MACHINIST came to hand, and there was the very job described in Practical Ideas—and by a writer from

Quality threading

AT MINIMUM COST



MODEL TG-624
6 x 18 Inch

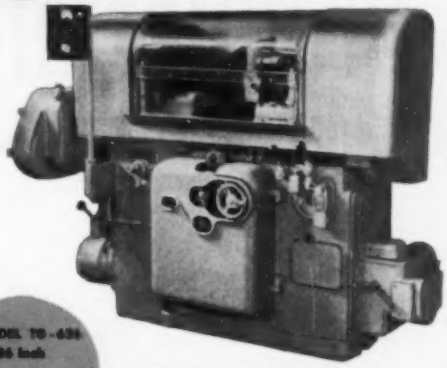
The 6 x 18 Automatic Thread Grinder is used for high production thread grinding with either single or multi-ribbed wheels on relatively small parts.

JONES & LAMSON
AUTOMATIC THREAD GRINDERS:

- Produce threads of better quality and more uniform finish
- Reduce handling cost
- Eliminate costly rethreading after heat treatment
- Eliminate expensive retooling when specifications change
- Reduce cost of gage maintenance

Built-in accuracy and automatic features, make any of these machines a paying investment for toolroom or production line.

- Automatic wheel truing
- Automatic infeed on successive cuts
- Automatic sizing
- Rheostat wheel speed control
- Diamond or crush dressing of wheels
- Multi-ribbed threading
- Right and left hand threading



MODEL TG-634
6 x 36 Inch

The 6 x 36 machine is extremely versatile and is used on long or short run jobs on a great variety of precision threaded parts. Single or multi-ribbed wheels can be used.

MODEL TG-1245
12 x 48 Inch

The 12 x 48 machine is used for grinding threads on a wide range of work from small to large heavy parts. Single or multi-ribbed wheels can be used.

When measuring the value of a thread grinder remember the extra benefits of J & L top-flight construction. Write Dept. 710 for illustrated catalog.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. Dept. 710

THREAD GRINDER DIVISION

HEAVIER CUTS IN HARDER MATERIALS AT HIGHER SPEEDS

Get More Production with GORHAM "M-40-B" Tool Bits!

Get more out of your machine tools . . . raise your production curve . . . with Gorham "M-40-B" turning tools! Use "M-40-B" wherever the application of a Super High Speed Steel is indicated, as in machining heat treated alloy steels with large amounts of stock removal at high surface speeds.

"M-40-B" is a Super Moly grade with performance characteristics comparable to those of super tungsten high speed steel. It has extremely high red hardness, high Rockwell hardness, and offers maximum toughness and abrasion resistance. You can take heavy roughing cuts with it at high surface speeds and feeds . . . use it for high speed finish cuts as well.

"M-40-B" comes in square tool bits, 11 stock sizes, and in 23 stock sizes of rectangular turning tools. Bits and turning tools are accurately ground, uniformly hardened, ready to sharpen. Special sizes and shapes to your order. Illustrated with prices are three popular size "M-40-B" tool bits. See your distributor, or send direct for a trial order.

"M-40-B" is one of three cutting tool materials developed by Gorham. Others are Gorham "Standard", for the commercial field, and "Gormet", for turning soft or abrasive stock. They're completely described, with size and price lists, in a new free bulletin. Send for your copy today.

Gorham TOOL COMPANY

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WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

Glasgow, Scotland. It's a small world.

A V Reed
Letchworth, England

Mr Reed's article on contour turning with 100-yr-old lathes will appear in AM shortly. Again, "Practical Ideas" lives up to its name. Send in ideas of your own.—Ed.

More Fundamentals

I wish you would reprint some of your "classic" articles from time to time. For example, we would like to be able to read the 1895 article of Edw K Hammond on making screws for scientific instruments, and others like it.

Articles on how to lap; how to scrape, etc. We realize that your major reviews of these subjects do treat of their modern aspects, but some of the old basic information is not to be found without research. Apparently, much of the best writing on machine practice was done in England around the time of Whitworth, and in the USA in later years.

Machine - tool magazines, these days, are devoted largely to a showing of how Ford heat treats 3 million parts a day, or something of the sort. We don't mean to be critical —we only wish that 1% of the space were devoted to fundamentals.

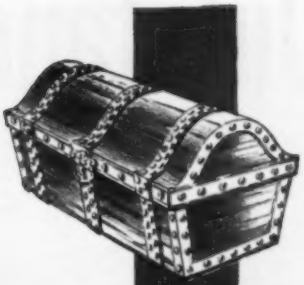
Henry A Boeckeler
Tucson, Arizona

Many of those old articles do make interesting reading, but we do not feel that enough of our readers care sufficiently to justify our reprinting them. And there is always the danger that some of the younger generation may overlook the original date of publication and try to adapt the methods shown to present-day production. The original story can still be read in the bound volumes in most libraries, or we can furnish photostatic copies.—Ed.

Printer's Error

In the article by R G Hicks (AM— July 21 '52 p100) the number of the coating A-417 and the firing temperature, 1850F, were inadvertently omitted from the table of characteristics. They should appear opposite the second paragraph.—Ed.

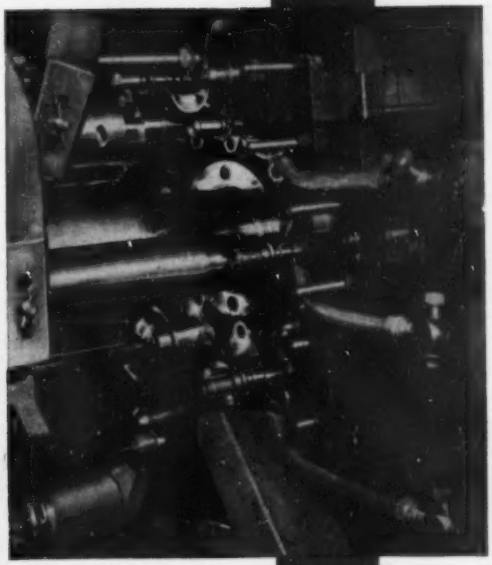
PIECES FROM EIGHTS



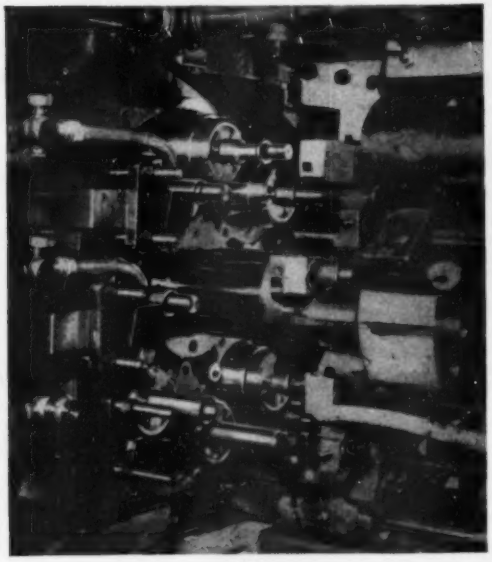
The first eight spindle bar automatics were introduced in 1930 by the late Frank L. Cone, founder of the Cone Company.

CONOMATIC Eights have had the usual opportunities available to any production tools that can handle added requirements and responsibilities.

With more tool positions than other "automatics", Eight Spindle CONOMATICS have an advantage in taking on, at one chucking, operations that save the costs of second handling.



Rear Side of Tooling Area



Front Side of Tooling Area

The milling and stamping operations performed by the 1¾-EIGHT, on the piece shown, did not require stopping the spindle. The dependable performance of CONOMATICS makes such money-saving operations well worthwhile.

A Comparison of ALL Automatics is in favor of Cone

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Outstanding ACCURACY

TO PRODUCE

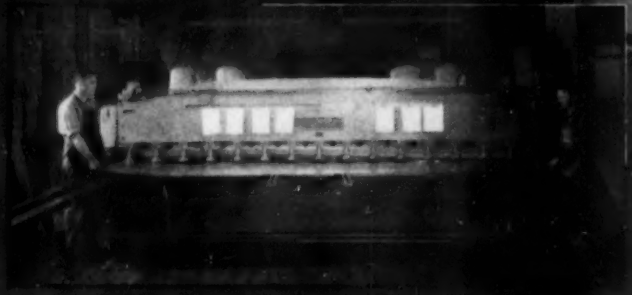
Modern Steel Kitchen

Hospital Sterilizer

Hospital Utility Cabinet

Special Stove

Three Cincinnati All-Steel Shears at Jamestown Metal Products Inc.



1814 Cincinnati All-Steel Shear with hydraulic holddowns, squaring arm and front controlled power back gauge.

is necessary...

THESE TOP QUALITY PRODUCTS

ACCURATE SHEARING

Jamestown Metal Products Inc. produces quality stainless steel equipment for hospital and home. Exact manufacturing standards are maintained.

Cincinnati Shears cut blanks accurately and to size for this equipment. Gauging must be rapid as well as accurate to handle the many different sizes required and keep production costs low.

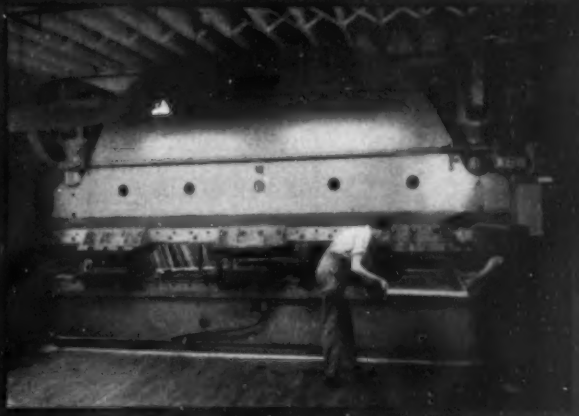
ACCURATE FORMING

Cincinnati Press Brakes form these blanks into accurate parts that fit correctly and insure outstanding quality in the finished products as well as maintaining low assembly costs.

You, too, can expect true blanks and accurately formed parts from this profitable team of Cincinnati Shears and Cincinnati Press Brakes.

Write for Catalogs S-6 and B-3, illustrating and describing these machines.

A row of Cincinnati All-Steel Press Brakes used in the production of these quality products



A 130 x 14 Cincinnati All-Steel Press Brake 14' 6" between housings tooled for multiple operations

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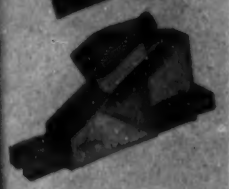
CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

CINCINNATI

Outstanding ACCURACY is necessary...

TO PRODUCE THESE *top quality products*



Slots, angles and compound angles are shaped to 0.001" limits on these solid 3140 forged steel tool holders.

Special index heads have slots accurate in shape, size, spacing and angularity to 0.001" on all dimensions.

Vee block fixtures of solid 6148 steel are completely shaped to very close limits.

Cincinnati Shapers do these jobs

The Jordan Specialty Company Shaping Specialists . . . use Cincinnati Shapers exclusively. Outstanding accuracy and versatility in production are obtained in connection with low machine investment and low tooling costs. Due to the great variety of work produced, changes from part to part must be done with minimum loss of time. Here, Cincinnati Shapers give an exceedingly profitable and outstandingly accurate performance.

Write for Shaper Catalog No. N-5 covering the complete Cincinnati line.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

SPOT NEWS of Metalworking

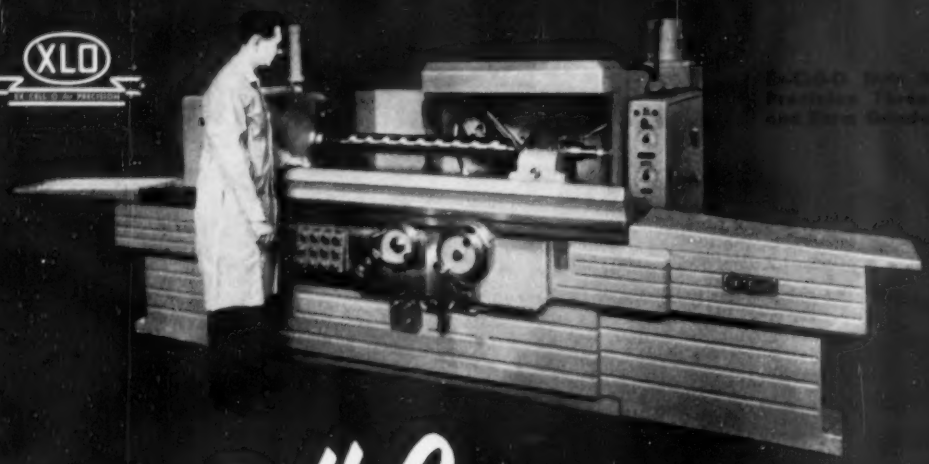
- **Long-term plan for pool orders for long lead-time machine tools** to be produced and to be ready in case of a future national emergency is being considered by and may be recommended by the Vance committee and be financed by fresh funds administered by General Services Administration. Buying program might extend over 4-5 years.
- **Ten cents seems to be size of 1952 seventh-round wage increase for unions** getting their second increase since the wage-price freeze of January, 1951. Rubber industry and copper mining are settling for 10 cents. Automobile workers have got 9 cents and are likely to secure a little more by year-end. The 21-cent package in steel covers sixth and seventh rounds. So will the increase John L. Lewis is seeking in the coal industry.
- **New 160 hp gas turbine weighing 212 lb** has finished Navy tests at Annapolis engineering experimentation station. Orders for volume production will soon be placed.
- **Older workers, over 45, may be pushed as important future labor force.** ODM Acting Director Steelman has recommended Department of Labor action to fill future expected gap of 3½ million at end of '53. Maximum-age provision in Civil Service will be liberalized or eliminated.

Retooling of existing machine tools, based on knowledge of machinability vs microstructure of materials, is expected to save one-third of departmental machining costs. Tool costs will be one-fifth as much as formerly. Step-up in output of existing machines in some cases allows one-half of installed machines to be released for other purposes. In one case the machining capacity of a department was doubled without a single new machine.

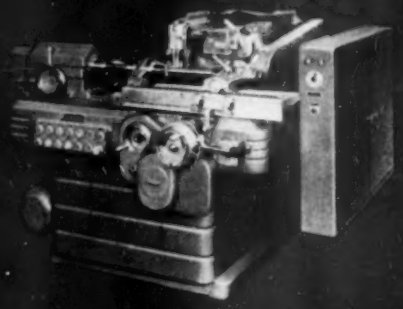
- **Navy will order three or four jet seaplanes next year.** They will be interceptors in the 700-mph class and will feature retracting floats.
- **West Germany's capital machinery is badly outmoded,** according to a report of a survey made b ythe Association of German Machinery Manufacturer. Need for many replacements is reflected by gures: 30.8% over 20 years old; 38.8% between 10 and 20 years old; and only 30.4% under 10 years old.
- **Patented Australian process applies permanent zinc coating to any iron or steel structure.** A compound of metallic zinc and other inorganic products in a water-soluble metallic silicate vehicle is brushed on. Coating is then heated and fused to make it insoluble.

Ear-to-the-ground on steel: Predictions are plentiful off-the-record that almost all types of steel will be in reasonable supply by early 1953; that high-cost steel-making facilities are marked for mothballing by some big producers by third quarter of next year. Amount of foreign steel ordered as result of steel strike is small fraction of tonnage taken in previous steel shortage.

- **Radio-isotope battery for jet planes, recently developed by Fairchild,** may prove to be a compact source of power for industrial applications. Industrial truck manufacturers are interested in checking its possibilities in connection with new fork-truck designs.
- **First preliminary report of Advisory Committee on Production Equipment,** the so-called Vance committee, was made to Acting Mobilization Director John Steelman on Aug 29. Full report of recommendations will be issued before end of September.
- **Soft soldering of sheet aluminum and magnesium directly with 50-50 tin-lead,** using no flux and no special cleaning or abrading preparation, is reported by Hubney Brothers, Roselle, N. J. Commercial model tool is being developed for specific applications.
- **Unrated machine tool orders will not be subject to replacement** in favor of rated orders after the freeze period begins, according to new proposed amendment to M-41 now in the making at National Production Authority. For details on machine tools, turn to p 95.



Ex-Cell-O Thread Grinders

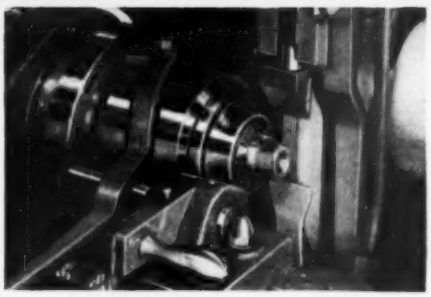


ARE IN DEFENSE WORK

GRIND THREADS ON PARTS FOR PLANES, GUNS, ROCKETS

Ex-Cell-O Precision Thread Grinders are in the thick of the defense program. They're used for grinding threads on parts for both jet and reciprocating aircraft engines and many items of armament. For accurate threads on hardened steel parts the threads must be ground after hardening. For alloys and stainless steels that are tough, though not extremely hard, thread grinding is often more economical than other methods.

Internal, external, and universal thread grinders are included in Ex-Cell-O's complete line. If you are considering thread grinding write or phone to Ex-Cell-O in Detroit for more information and complete specifications. Better yet—call in your local Ex-Cell-O representative and show him the job. He's qualified to help you.



Threading gun barrels on a Style 33 Thread Grinder with multiple rib wheel.

EX-CELL-O

CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington

New stretchout of defense production is in the works. It pushes back the goal for peak output of arms about a year—from early '53 to spring or summer of '54.

• • •

But few contracts will be cancelled—if any. Unlike the original stretchout last December, this one involves no drastic slashing of the armed services' spending plans. It's largely a pushing back of delivery dates on arms and equipment that wouldn't have been ready on time, anyhow.

It does change spending plans significantly, however. Up to a few weeks ago, services expected to spend $52 billion in fiscal year ending next June 30; $53 billion the next year (fiscal '54); $46 billion in fiscal '55; $38 billion in fiscal '56. New schedules for the four years call for spending $48 billion this fiscal year, $55 billion in '54, $49 billion in '55, and $41 billion in '56.

• • •

Procurement accounts for the slippage in spending—$4 billion less than planned for the 12 months ending June 30.

Steel strike accounted for part of this loss. It halted, or slowed, about 10 to 15% of production planned for this year. Then, military contracting slumped this summer when Congress threatened a big cut in appropriations. And, as usual, government red tape stalled some defense programs.

• • •

Some military chiefs like the new stretchout. First, it gives them an excuse to slow down some production that's been getting embarrassingly high—trucks, light tanks, jeeps, some small arms. Taxpayers might ask some tough questions if they saw how much of this kind of equipment has been stacked up in warehouses, military depots, and at defense plants.

It means smaller appropriations for next year. That will make it easier to deal with Congress, which showed signs of clamping down on the military this year.

• • •

Next year's military budget is shaping up. Defense department and budget bureau have decided to ask for appropriation of no more than $47 billion for defense—excluding foreign-aid arms and atomic energy—for the fiscal year starting next July 1. That's what Congress appropriated for the current fiscal year. With carryover (unspent) funds, it will give the military enough to hit their spending target of $55 billion in fiscal 1954.

• • •

Details of military spending plans also show up in the new budget. About $26 billion is earmarked for procurement—hard goods, soft goods, and construction. Spending for ships, heavy ammunition, guided missiles, and construction will rise. Less money will go for aircraft, trucks, and small arms.

• • •

Stretchout means slowdown to defense contractors. You can see that in the new schedule for aircraft deliveries. It cuts delivery rates over the next four years less than 5% below the previous schedule. But that's enough to delay Air Force buildup to 143 groups until 1956—instead of a year earlier.

Cuts in aircraft production are general—a few less fighters, bombers, and trainers each of the next four years than previously planned. Exceptions: Boeing's orders for B-52 jet bombers have been doubled, with delivery still set for 1954-55. Air Force also has upped it's orders for the Martin B-57 bomber by about 10%.

• • •

Stretchout insures the end of CMP, too. With less push behind defense production, you can bet materials allocations will be called off by April 1—barring any new emergency.

Controls agencies are mopping up. When DPA-NPA boss Fowler leaves—some time after October 1—DPA will merge with Steelman's ODM, and NPA will go back under full control of Commerce Department.

• • •

Present plans are to continue DPA and NPA, even after serious controls end. In Commerce, NPA, with a reduced staff of career bureaucrats, would administer the cleanup of controls, stand ready to start another CMP in event of a new crisis.

DPA would concentrate on planning, either as part of ODM or as a separate agency. It's already mapping out materials and new-plant requirements for all-out war, steps to be taken in event of bombing of key industries.

• • •

Fabricators whose payrolls follow steel and who want to match the recent steel settlement will get special treatment from the Wage Stabilization Board.

They may put the increases into effect 30 days after seeking approval, unless notified otherwise. Applications should note plainly, however, that the increase is tandem with steel.

• • •

The North American Aviation arbitration with UAW-CIO will make the first use of WSB "advice" in labor disputes. It provides that the arbitration panel must clear its recommendation for a general wage increase with WSB before announcing it.

WHO IS RESPONSIBLE

for the machine-tools in your shop?

- **The dealer who sold them?**
- **The Engineering Company that designed them?**
- **The factory that built the machine, tool, or fixture?**

Where can you get complete service and satisfaction?

With users of Microhoning equipment there is no possibility of divided responsibility. One organization sells, engineers, builds, and services the complete installation. Micromatic is proud to assume full responsibility for all equipment and the results obtained with the Microhoning process.

As the leader in the development of the honing process, Micromatic offers a complete line of equipment for processing all types and sizes of cylindrical and flat surfaces.

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Detroit

Automobile production has been limping, as was forecast when the steel strike ended. The first full week of August saw 44,000 completions, U.S. and Canadian cars and trucks combined. The second week it slipped to 38,300. The third week it doubled up to about 75,000, and from then it was expected to do no more than hold its own—if that.

Labor Day's loss will pull down totals for the first week in September. After that, the sailing should be smoother. The experts figure the September volume will be about where it would be had the strike not occurred—perhaps around 400,000 completions.

• • •

September might see some new-car output. The Chrysler divisions may be making their wares by then. There are reports—unconfirmed, as always at the start of model seasons in Detroit—that some new Chrysler Corporation cars are already being built.

Specifics on that report: Two lines are operating, one building new components, one old. When the time comes, the old-model line will switch over, and its initial fits and starts will be completely cushioned by the then-smooth movement of its neighbor.

• • •

Chrysler will have air conditioning for its cars before too long. That's the implication of an announcement of work in development—an announcement that followed tight on the heels of the GM announcement of a conditioner option on 1953 Cadillac and Olds cars. Airtemp is doing Chrysler's work.

You can get a conditioner on a Ford right now, if you want to pay $435 for it installed. The device is made by a Fort Worth company. That price is a big package anywhere out of the hot south. Auto-industry betting is that the first company-produced conditioners out next winter will cost even more than that.

• • •

The way the machine-tool and tool-and-die shops are operating, there'll be plenty to hear about on both 1953's and 1954's. Higher-voltage batteries and electrical systems are ahead. So is more power steering. So are more powerful engines—new ones on Dodge and the biggest Buick for 1953, maybe Ford, probably Pontiac for 1954. Besides that, everyone will continue to step up horsepower.

That brings up a choice tidbit: Talk to any engineering-lab man around Detroit and he'll head off at the horsepower claims of his competitors. The viewpoint is universal: "Those fellows must use some ways of measuring that horsepower we never heard of!" **That identical line** from competitors talking about each other makes for a quiet smile.

• • •

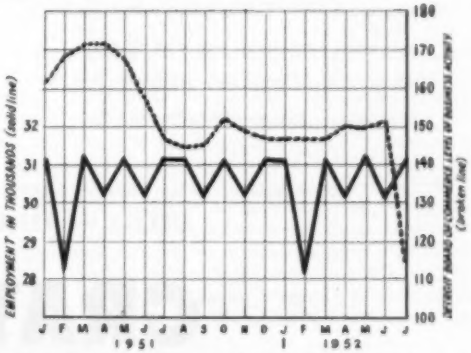
You'll see new body lines, too. "We've got good lines," said one volume producer. "But you have to face it. An auto's like a suit of clothes. After a couple of years it begins to look dowdy. Practically everybody's got the same style they developed right after the war."

Behind these plans for revisions is one factor: Sales. They've shown increasing mushiness in the past year. They'd have been definitely down, compared with production, had not the steel strike throttled output down so sharply. For 1953, everyone's doing everything he can to take no chances on a soft market.

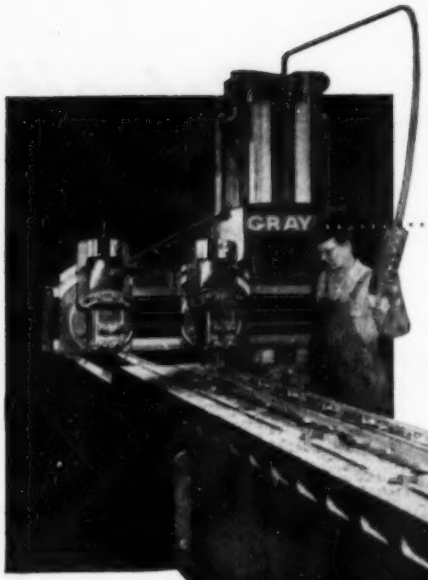
• • •

Lincoln-Mercury's doing better than most in that respect. Its assembly switch is likewise a notable operation. Begining in mid-August, transfer began of output facilities from the Warren Ave plant in Detroit to the new assembly operation at Wayne, Mich. No production is being lost in the process. Jobs are being moved one by one; first bodies in Wayne were built Aug. 11, and the last of the transfers won't occur till mid-October. There are no big plans yet for the old Warren Ave plant.

HOW THE STRIKE HIT DETROIT



July 31 level of business activity in Detroit (103.6) was the lowest since the big GM strike in Feb '46, when index was 102.1. Postwar high was 177.7 on Oct. 15 '50. Figures are from Detroit Board of Commerce.



. . . delivers high production-low cost carbide planing!

Here's high production — low cost carbide planing at the Beloit Iron Works, Beloit, Wis. This GRAY OPENSIDE PLANER CUB is running 300' per minute, day in — day out, carbide planing packing strip holders for suction rolls of paper making machinery.

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Planer jobs don't grow old on a GRAY!

Ever see a planer running wide open, day after day at 300' per minute? That's the pace of a new GRAY — the pace that makes your old planer look really old.

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Because a GRAY CUB is not only an economical initial investment — it also insures substantial savings in time and money thru its high speed, accurate production ability.

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The G.A. **GRAY** *Company*

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planer type milling machines
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Machine Tools

Unrated machine-tool orders could not be displaced from builders' order boards in favor of rated orders in the freeze period, if a new amendment to NPA's M-41 goes through.

This amendment is now in the works, but it will take a little time to get all the official blessings. Just when it will be issued is anybody's guess.

The amendment will remedy a glaring weakness in present regulations, which make any unrated order subject to diversion to a rated customer, right up to the day of shipment.

It will enable builders to give a firm delivery date to foreign as well as domestic purchasers, something they haven't been able to do lately.

• • •

The fact is that most unrated orders probably would be filled on schedule, even under today's rules. The demand for rated orders never has been high in certain types of machines. And it is considerably less now than it was.

But hanging over builders and customers has been uncertainty about what might happen. Foreign builders in particular have not been so handicapped. They have been able to make delivery promises which stick.

• • •

July machine-tool orders hit a new high for the year on the index of the National Machine Tool Builders' Association. They stood at 376.4, the same as last December. Best previous month in 1952 was January, with 347.8.

Shipments dropped off in July to 254.6, compared with 330.8 in June. Vacation shutdowns, many of them for two weeks' duration, were responsible. Steel strike had little if anything to do with the decline.

August figure should be back up. Industry is now running at about $100-million-a-month rate and should stay there a while.

• • •

A few builders have not yet got up to their peak. On the other hand, others are beginning to draw in outside work as backlogs shrink.

Order boards of machine-tool builders making types and sizes outside those reserved exclusively for rated contractors run, on the average, only to the middle of 1953.

Despite the upturn in orders recently, there isn't much to give comfort to builders in the immediate outlook for work from defense sources.

• • •

A new stretchout of defense production is just ahead. That means that the pressure will be lessened and more cancellations may be in prospect.

At this point no one knows for sure exactly what effect the new stretchout may have on machine tool orders.

The Navy is talking like a poor man. It hasn't very large sums earmarked for machine tools the current fiscal year. And the emphasis on slashing expenses is making the Navy cautious.

• • •

Then there is a lot of talk in Washington about deflation of NPA by the year-end or shortly thereafter. The talk comes from high places.

NPA will have performed its chief emergency job by then. When Henry H Fowler leaves as NPA director, a civil service officer of the Department of Commerce is likely to take over. H B McCoy, who loomed prominently in the early days of NPA, may be the man.

NPA will shrink drastically in every way—in budget, in number of employees, in office space.

It may find itself completely out of the New GAO Building and back in the Commerce Dept. Building or in temporary buildings controlled by Commerce.

The days during which the machine-tool industry and other industries may be called upon to loan men to NPA for prolonged periods thus may be numbered. In 1953 permanent government employees may inherit the duties.

• • •

The so-called Vance committee, officially known as the Advisory Committee on Production Equipment, was scheduled to make a preliminary report to Acting Mobilization Director John Steelman on August 29, according to word when we went to press.

This report is being rushed because the planning of the fiscal 1954 budget (beginning July 1, 1953) will start soon. Included in that budget should be money for broadening the mobilization base.

The first full-dress report of the Vance committee is to be ready before the end of September.

The Vance committee is expected to advocate a long-term program for building long lead-time machine tools (which Washington refers to as the "elephants," the standard smaller tools being the "rabbits").

This program might extend over 4-5 years and would be financed by pool orders placed by GSA.

The idea would be to have such big machines on hand before a national emergency arises.

Question is whether existing capacity for building such machines is large enough. If not, plan is to provide government money to erect further facilities and lease them for operation to present producers.

BF

Do up to 80% of your

STANDARD CARBOLOY TOOL PRODUCTION TIPS

1. A large radio manufacturer solved several of its trickiest, toughest automatic screw-machine problems by ignoring accepted practices and switching from steel tools to cemented carbide tools. First, a modified Standard Carboloy Tool (Grade 883 carbide tip) is used to turn B-1113 steel. Finish and accuracy are exceptional — *and tool life is extended to 50 to 60 hours of continuous production.*

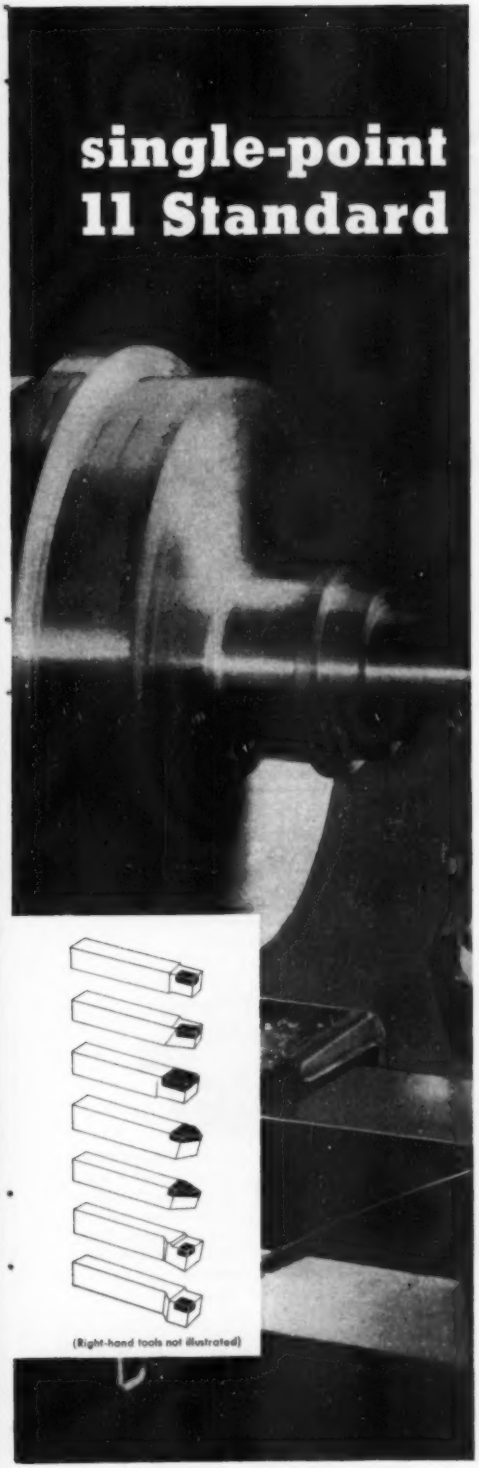
Second, high-speed steel tools failed completely on the cut-off job when positions were decreased from 3 to 2, and feed was increased from .0024" to .0037". Again breaking with tradition, this manufacturer cuts the B-1113 steel to dead center with Standard Carboloy Tools using Grade 883 tips.

2. A large motor-car company now performs nine roughing operations simultaneously on a 13½" O.D. cast aluminum converter pump with a special tool head incorporating modified Standard Carboloy Tools. The operation consists of 9 cuts — 3 facing, one boring, 3 combined boring and facing cuts, and 2 combination facing and chamfering cuts.

Total feed is .012" per revolution. Cutting speeds range as high as 3400 SFPM, spindle speed 800 rpm. *Output per machine per hour is tripled.*

If these cemented carbide applications suggest Standard Carboloy Tool uses you would like to explore further, please get in touch with your Carboloy representative.

single-point machining with 11 Standard Carboloy Tools



(Right-hand tools not illustrated)

11 Standard Carboloy Tools will do up to 80% of all your single-point turning, facing and boring . . . eliminate hundreds of costly, inventory-loading special tools.

What's more, fast-cutting Standard Carboloy Tools boost production as they chop tool and maintenance costs. *This has been proven in all types of shops on an industry-wide basis.* Tipped with the quality brand of cemented carbides, Standard Carboloy Tools easily outproduce and outlast steel tools by as much as 10 to 1 or more.

Cut faster, better, for less

Why not test Standard Carboloy Tools on your toughest job? Prove for yourself that whether used "as is" or quickly and economically ground to special shapes in your own toolroom, Standard Carboloy Tools will do your single-point machining jobs faster, better, for less.

And don't overlook the plus-values in Standard Carboloy Blanks. They're available in many styles; mass-produced at low cost in hundreds of sizes. They're easily brazed to tool shanks to handle those emergency jobs, without time or money wasted waiting for specials.

Extra carbide benefits

Carboloy-Developed Services lead to more efficient selection, design, use and maintenance of cemented carbide tools, result in *extra* carbide benefits. Services include Customer Training School, technical manuals, charts, catalogs, low-cost slide films . . . and on-the-job assistance of skilled Carboloy engineers to crack specific carbide problems.

Write for complete Carboloy General Tool Catalog, GT-250, or contact your local Carboloy Sales Engineer or Authorized Distributor today.

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Magnet ideas to speed up general shopwork

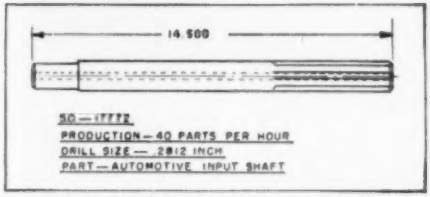
See how Carboloy Permanent Magnet Sheet-Steel Separators prevent feeding of doubles. How permanent magnets give an extra "hand" in general shop work, including . . . magnetic stands, tool-holding devices, sweepers' pick-up tools, magnetic paper grippers on machines, containers for small parts and magnetic retrievers. (Write for Carboloy Magnet Ideas Kit, PM-102.)

ARE YOU HAVING HOLE TROUBLE TOO?

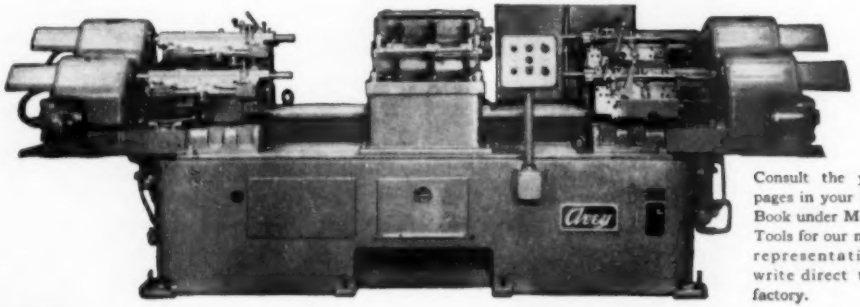
LET *Avey* ENGINEERS SOLVE YOUR PROBLEM!

HORIZONTAL DEEP HOLE DRILLING MACHINE

S. O. No. 17772 — Consists of four No. 1 *Avey-draulic* (hydraulic) Deep Hole Drilling Units mounted horizontally on a well-ribbed fabricated steel base. The Units having 12" ram travel were arranged in pairs to drill a $\frac{7}{32}$" diameter hole 14½" deep from both ends. An electrical interlock was provided to prevent drill interference. The coolant system and hydraulic power source were incorporated in the base. Machine as illustrated conformed to Automotive Standards. Write for literature.



Fixtures—The fixtures were Vee Block type hand clamping to accommodate one part each.
Material—8641 Steel.



Consult the yellow pages in your Phone Book under Machine Tools for our nearest representative or write direct to the factory.

Avey DRILLING MACHINE CO.
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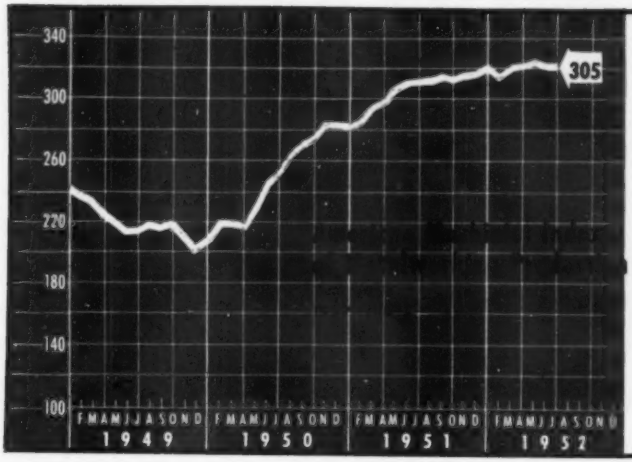
Gaging Metalworking



INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	AUG. '52(*)	JULY '52(p)	JUNE '52(r)	JULY '51
	305	**293**	**320**	**311**
Machinery	308	316	310	
Electrical Manufacturing	339	349	342	
Automobiles	140	228	219	
Other Transportation	540	538	433	
Other Metalworking	288	306	317	

(*)Estimated (p)preliminary (r)revised

The steel strike played hob with metalworking production, AMERICAN MACHINIST Index reveals.

In July the index took a nosedive to 293 from the June figure of 320.

With the end of the strike, recovery set in. And August made a better showing at 305.

• • •

But a full recovery will not be reflected until September figures are out. Even then it is doubtful whether production will have swung back up to the June level.

The situation, though, was not as bad as the index shows. The index was pulled down mainly by the automobile component, which plunged from 228 in June to a mere 140 in July.

Note that in the "other transportation" component, mainly aircraft, production nosed upward right in the middle of the strike. Even machinery and electrical manufacturing operations suffered only minor setbacks.

• • •

Orders for screw machine products have risen five out of the past six months, including July.

Inquiries are at an all-time high, both in numbers and in quantities to be quoted on. But don't be fooled, because actual business being placed is for relatively small volume per order.

Screw machine products industry can't explain this situation, which is worrisome. It is short on machines to produce large-size items. It also has manpower trouble and has been losing men to higher-paying defense industries.

Backlog is steady, averaging 4-5 months.

• • •

Independent stampers are feeling better about future business, after rough times for five months.

Production isn't much higher than half-capacity. But quickened automotive and defense work is being reflected in increased orders and inquiries. Both extend into '53.

Stamping plants don't look for normal steel deliveries to be resumed until the fourth quarter.

Backlogs are small, but show signs of growing a bit.

• • •

A second stretchout in the defense production program is in the making. It is likely to affect all branches of the services, particularly aircraft. It may mean a year added on to schedules.

This plan will ease further any tension which might be put on the civilian economy. It will mean more materials and more manpower for peacetime goods.

It presages a still lower peak in metalworking operations as a result of defense pressures.

• • •

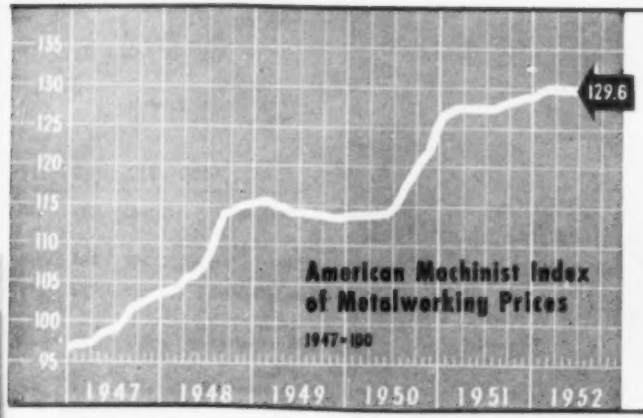
Consumer goods makers are encouraged by the upward trend of retail sales. One company's experience seems typical—dealers' inventories are depleted. Bargain prices and removal of federal credit restrictions turned the trick. The market looks good for remainder of the year.

Automotive prospects are looking up too. Car assemblies should be brisk during September and the fourth quarter. Parts manufacturers consequently report increased business.

The steel situation shows signs of clearing up faster than anticipated. Not that things are not rough for a lot of users just now. But the crisis will not be prolonged far into next year as the gloomier prophets had predicted.

September and October will be the worst period for many steel consumers.

Gaging Business



PRICE INDEX

	AUG. '52(*)	JULY '52(p)	JUNE '52(r)	JULY '51
	129.6	**129.4**	**129.4**	**127.8**
Metalworking Machinery	136.6	136.6	133.2	
Other Machinery exc. Electrical	132.2	132.2	132.2	
Electrical Machinery	124.9	124.9	127.2	
Fabricated Metal Products	127.8	127.8	124.8	

(*)Estimated (p)preliminary (r)revised

June manufacturing shipments were off 5%; durable products, mostly primary metals, fell $1.3 billion, while nondurable goods held about the same as in May.

Preliminary July estimates show a decline in most manufacturing. Usually there's an employment increase of about 400,000 in June, but the steel strike offset this seasonal gain, and employment stayed around 46.3 million.

• • •

Average work week rose slightly in June. Increased hours in nondurable-goods industries more than offset steel losses. Overall, industry reports shorter work hours this June than during June of last year.

Hourly earnings were $1.66, the same as for the last four months. However, this figure is up 7¢ from last June. Weekly wages almost reached $67.00.

Gross National Product Index is now running at $347 billion, where it was only at $343 billion during the second quarter.

Personal incomes were at a level of $264 billion during the first half of this year. The June level was $266 billion, but the July figure will be lower. Recent figures show that consumers are spending more and saving less.

• • •

About 45% of plant-expansion aided by rapid tax write-off is now in place. This amounts to $10 million worth of facilities.

• • •

Manufacturers' stocks declined $350 million in June, all of the drop being in durable goods, and mainly accountable to the steel strike.

New orders in June equalled early highs during the year, and were just under the June '51 peak.

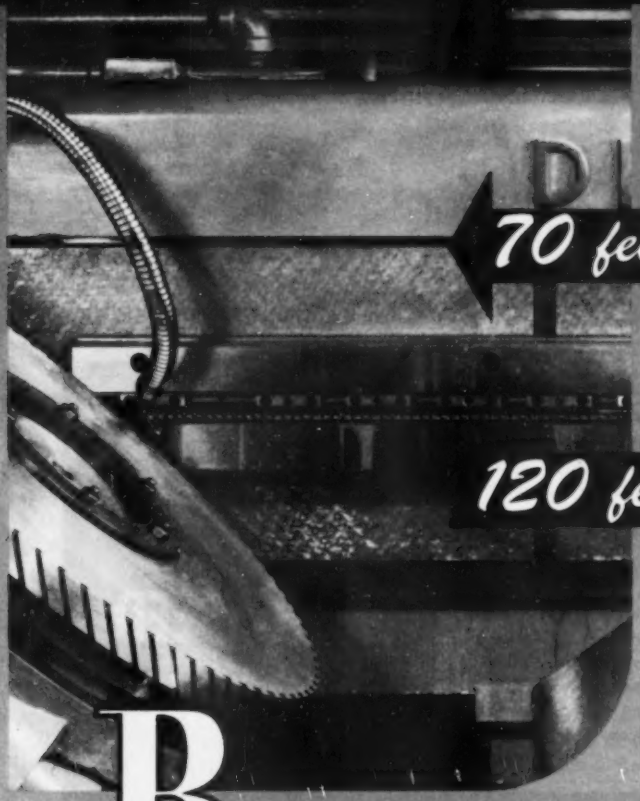
WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	230.9	228.8	232.7
Steel ingot operation (thousands of tons)	2,019	1,938	2,007
Electric power output (million kilowatt hours)	7,627	7,495	2,164
Production of automobiles and trucks	38,295	43,964	129,661
Engineering construction awards (*Engineering News-Record*, millions)	$1,366.1	$237.5	$188.9

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1935-1939 = 100)*	192	203	212
Index of durable manufactures production (1935-1939 = 100)*	227	248	265
Durable goods manufacturers' sales, millions*	$10,291	$11,481	$10,383
Electrical machinery manufacturers' sales, millions*	$1,192	$1,094	$1,000
Other machinery manufacturers' sales, millions*	$2,079	$2,177	$1,760
Durable goods manufacturers' new orders, millions	$11,519	$10,538	$13,257
Electrical machinery manufacturers' new orders, millions	$1,553	$1,085	$1,453
General machinery manufacturers' new orders, millions	$2,209	$1,848	$2,291

* Seasonally adjusted.



Broaching compressor wheel slots

Broaching intricately formed slots in aluminum compressor wheels at a speed of 70 feet per minute — with a return stroke of 120 feet per minute — is a practical reality at Detroit Broach. This great broaching advancement is the result of imagination and sound broach-engineering experience . . . a combination forged by years of creative engineering and manufacturing of broaches and broaching tools exclusively.

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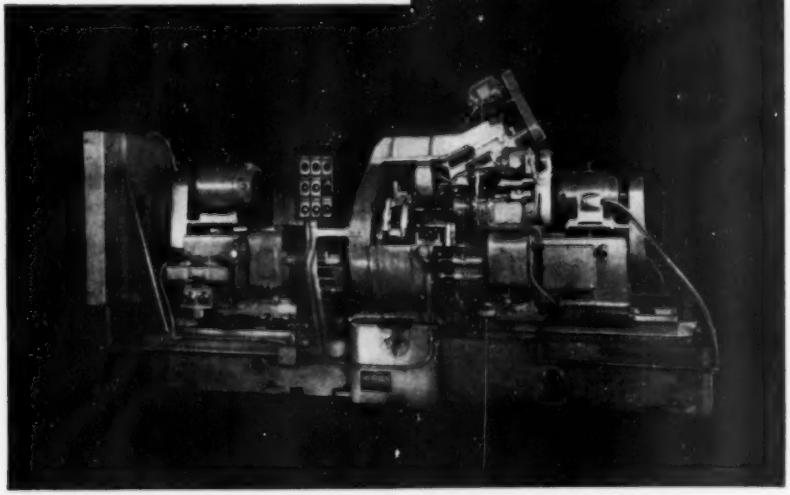
Producing crankshaft main bearing caps, this MORRIS Two Way, 6-Station Machine performs 29 operations with a single loading. One head carries 14 spindles, the other 12 spindles. Production rating is 87 pieces per hour at 100% efficiency. Operations performed include drilling, reaming, spot-facing and tapping.

This Morris application, for a leading automotive manufacturer, illustrates that "two heads are better than one" for higher production at lower cost. Put your heads together with MORRIS Engineers on any mass production, multiple drilling, reaming, tapping and similar operations. You'll save time, money, labor and floor space.

on this

Morris

MOR-SPEED MACHINE



"A Better Product at Less Cost . . . with PRECISION PLUS PRODUCTION"

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Defense Policy That Makes Sense

OUR national defense production program since Korea has been a halting and confused affair. Just when it seemed to be taking tangible shape, it became blurred and unrecognizable.

This constant shifting about and inability to reach firm decisions have been a source of frustration to metalworking companies. More than that, the program itself has suffered and we do not begin to have the armament at this time that we should have had.

The depressing account of what happened is set down in the recent report of the Subcommittee of the Select Committee on Small Business of the U. S. Senate—the so-called Moody Committee. The report also points the way to avoid in the future a repetition of the dismal events of the past two years.

MACHINE tool shortages have caused incalculable harm to small manufacturing concerns, the report declares. They prevented many companies from taking on defense contracts necessary to their survival. The same shortages kept larger manufacturers from subcontracting work to smaller firms. And the defense effort was harmed as a result.

The committee laid at Washington's door the blame for this situation. It used such strong language as "inexcusable shortsightedness" and "gross mismanagement" on Washington's part in failing at the outset to recognize the importance of the machine tool industry in any defense program. The experience of World War II was ignored and the same mistakes repeated.

The report excoriated the Department of Defense for failing to come up with a master preference list of defense contracts until 18 months after Korea. This delay the committee termed "a classic example of misfeasance." The committee also took Pentagon to task for shifting its schedules constantly. That made impossible the attainment of production goals.

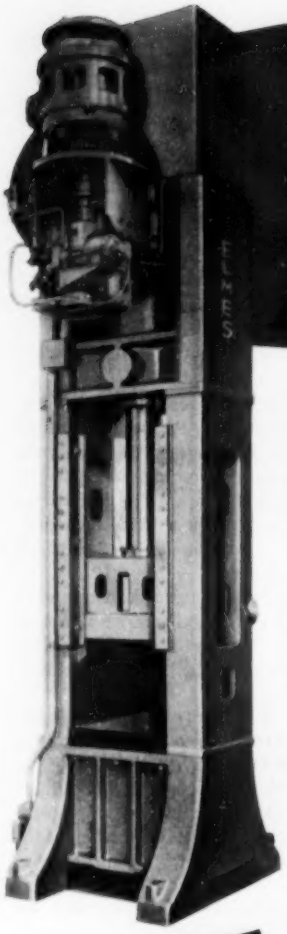
As it looked ahead to our future defense needs, the committee stressed the importance of a program for stabilizing the machine tool industry. The peaks and valleys should be smoothed out.

SUCH a program, it believes, should include stockpiling in a national reserve of surplus machine tools rather than their release to users at sacrifice prices. It should include more rapid tax amortization of capital equipment, accelerating the modernization of industry and providing a lively market for machine tools.

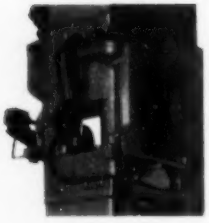
It also would establish fully tooled plants for emergency production of armament—the "overtooling" which defense officials have long talked about.

Here is a program which makes sense. It puts the nation's metalworking industries into position to go to work on armament with a minimum of delay in an emergency. It helps keep those industries tooled with new modern machines. It contributes immeasurably to a healthy strong machine tool industry. It safeguards the national interest. It should be adopted as our national policy.

Burnham Finney

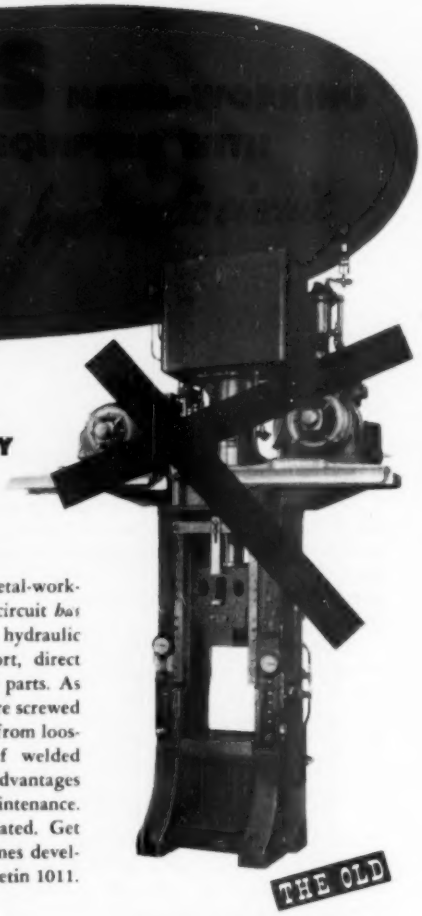


THE NEW



REVOLUTIONARY DESIGN ENDS COSTLY HIGH PRESSURE PIPING TROUBLES!

In Elmes Pipeless Hydraulic Metal-working Presses, the main hydraulic circuit *has no piping!* All high-pressure hydraulic fluid is conducted through short, direct passages drilled in the structural parts. As a result, there are no high-pressure screwed joints to loosen, no oil dripping from loosened fittings, no possibility of welded joints breaking loose. These advantages make for remarkably low-cost maintenance. Downtime is practically eliminated. Get the facts on this outstanding Elmes development now. Write for new Bulletin 1011.



THE OLD

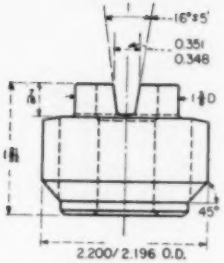
New Elmes Drawing and Forming Press Equipped with Pipeless Hydraulic Circuit

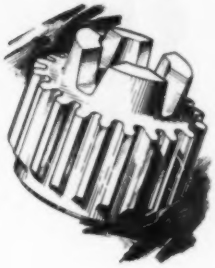
Upper left shows rear view of press. Cutaway view at the left shows front section around cylinder barrel. Note in both views the absence of any piping in the main hydraulic circuit. The only pipes on the entire press are the pilot, suction, and drain lines. Of these, only the pilot line carries high-pressure fluid.

(Above) Drawing and Forming Press with Conventional Hydraulic Circuit

The extensive high pressure piping shown on the press above has long, indirect fluid passages, making for frequent downtime and high maintenance costs. This time and cost burden is practically eliminated by the revolutionary new Elmes pipeless construction.

American Steel Foundries





Transferring powder from die to upper punch permits successful pressing of complicated gear. Fast lower pressure stroke of special hydraulic press combined with "floating" upper punch makes it possible to form gear with hub end up. Sintered iron-powder agitator-shaft gear has tensile strength of 30,000 to 35,000 psi. Pressed at 50,000 psi, production rate is above 500 pieces per hour

INGENIOUS TOOLS MAKE COMPLEX METAL-POWDER PARTS

Latest advances in powder metallurgy are mechanical as well as metallurgical. Here are described unusual pressing tools for making complex powdered-metal parts and ingenious sizing equipment for holding close tolerances.

By GEORGE H De GROAT
ASSOCIATE EDITOR

RECENT METALLURGICAL ADVANCES have increased the applications of powder metallurgy to include its use for high-strength structural parts formerly made only of wrought materials. With these advances came the need for tools capable of producing complicated shapes with uniform density and strength at high production rates.

In an interview with John Haller, vice-president of Michigan Powdered Metal Products Co, Inc, Northville, Michigan, we learned that unusual tooling problems are everyday occurrences because this firm specializes in the fabrication of complex, high-strength, metal-powder parts.

"FLOATING" TOOLS PRESS GEAR WITH PRONGED HUB

ONE such part is an agitator shaft gear having 20 involute teeth of 10 diametral pitch; an outside dia of 2.198 in., ±0.002 and an overall length of 1 21/32 in. Although gear-tooth tolerances are fairly tight, the complex part of the gear is a slotted hub 1⅜ in. dia and 7/16 in. long. Four tapered slots, equally spaced radially around the hub, are central with the bore within 0.0015 in. total indicator reading and are the full depth of the hub. Problem was to

press the hub, which, because of the slots, amounts to four prongs, with the same strength and density obtained in the gear body.

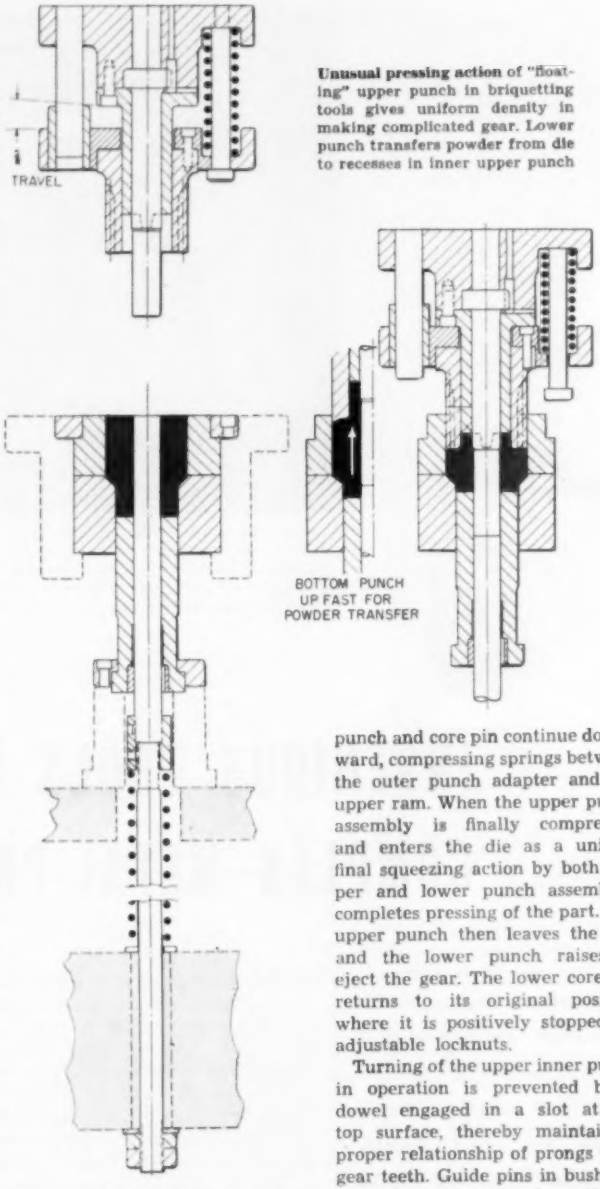
Contrary to what might be expected, the hub, or prong, end is pressed in the upper part of the die, being formed by the upper punch rather than the lower. This was done to eliminate die construction difficulties as well as to speed production rates. If the part were pressed conventionally with the prongs down, fragile briquettes would tip over and break when the powder filler shoe swept them from the die at the ejection stroke. This, of course, would slow production because it would be necessary to pick each one out of the die as it is ejected.

Powder Transferred From Die to Upper Punch

In the pressing operation, powder is transferred from the die to recesses in the upper punch that form the prongs. The upper punch is made of three major parts; an outer sleeve having a gear-tooth form to mate with the die contour and mounted in a spring-loaded adapter, a slotted inner punch to form the hub prongs, and a core rod that forms the gear bore after it depresses a core pin in the die.

The die is also made of three major parts. An outer casing made to fit the press contains two hardened and ground sections. The upper portion has the gear-tooth form, while the lower section has an angular step for forming a 45° angle chamfer near the end of the part opposite the hub. The lower punch is a close slide fit in this section of the die and forms a boss at the part end. A "floating" core pin fits inside the lower punch and disperses powder during die filling. This core pin is backed up by a compression spring for returning it to a position flush with the top of the die after pressing.

On the down stroke, after the die is filled with powder, the upper core pin engages the lower core rod in the die, driving it downward against a positive stop. The outer upper punch, with the gear-tooth contour then enters the die, while the lower punch quickly rises from the fill position, transferring powder to the recesses in the inner punch and simultaneously distributing powder throughout the die. Resistance of the powder to compression, however, causes the outer punch to remain stationary after entering the die about ⅛ in., while the inner punch and core pin continue downward, compressing springs between the outer punch adapter and the upper ram. When the upper punch assembly is finally compressed and enters the die as a unit, a final squeezing action by both upper and lower punch assemblies completes pressing of the part. The upper punch then leaves the die, and the lower punch raises to eject the gear. The lower core pin returns to its original position where it is positively stopped by adjustable locknuts.

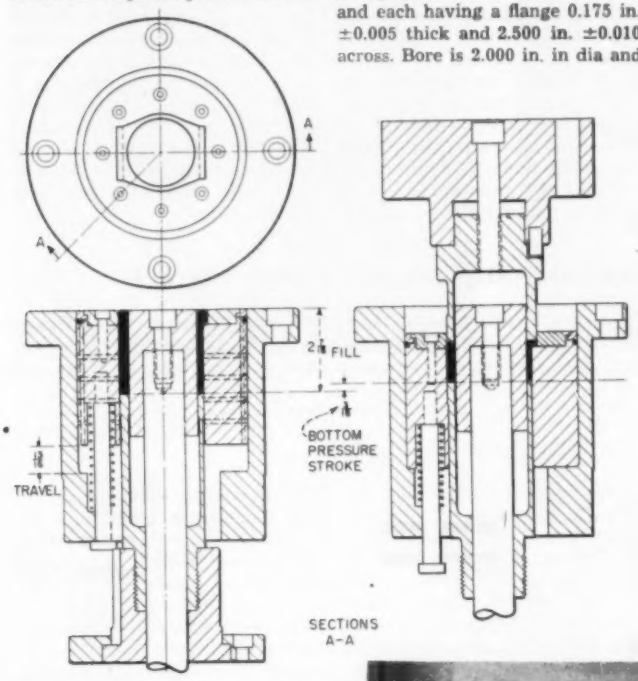


Unusual pressing action of "floating" upper punch in briquetting tools gives uniform density in making complicated gear. Lower punch transfers powder from die to recesses in inner upper punch

Turning of the upper inner punch in operation is prevented by a dowel engaged in a slot at the top surface, thereby maintaining proper relationship of prongs with gear teeth. Guide pins in bushings keep upper punch members aligned and general rugged construction of tools permit fast operation, over 500 pieces per hour, at briquetting pressures of 50,000 psi. Tensile strength of sintered gears is 30,000 to 35,000 psi. the material being an iron-base powder sintered conventionally.

BRIQUETTING A FLANGED CAM BLOCK

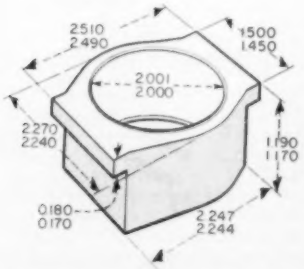
THE "floating" principle is also used to obtain uniform density in an iron-powder cam block briquetted at 50,000-psi pressure at a rate of 600 pieces per hour. Two opposite sides of the block have curved cam surfaces, the outside dia being 2.255 in. ±0.015. Sides adjacent to curved surfaces are straight, 2.2455 in. ±0.0015 across and each having a flange 0.175 in. ±0.005 thick and 2.500 in. ±0.010 across. Bore is 2.000 in. in dia and height of cam block is 1.180 in. ±0.010.



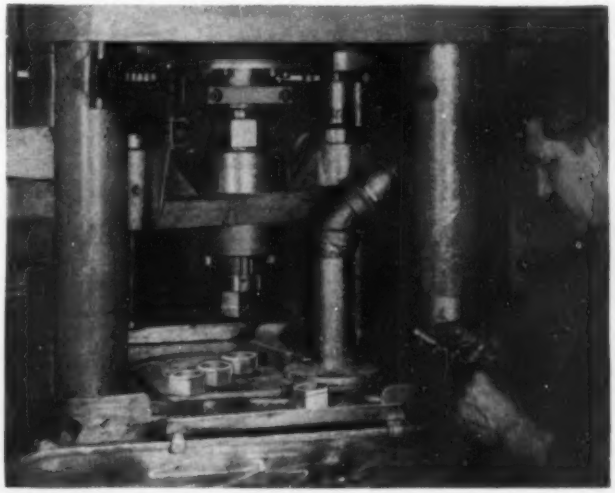
Successful pressing of flanged cam block is due to split die construction and "floating" principle in briquetting tools. Die travels downward 13/16 in. under pressure from upper punch to distribute pressing action. Thickness of upper section of die is equal to powder fill depth of flange

Greatest difficulty in pressing this part is to maintain uniform density under the flanges where the cross-sectional area varies. Die fill for flanges, based on 2:1 compression ratio (amount of powder to length of pressed section), is maintained by the height of a precisely ground die assembled on top of a floating die. Flanges are formed in this upper section by a closely fitting upper punch which enters it to press the powder down against the projecting surface of the lower die. Compression springs under the lower die assembly permit 13/16 in. travel under pressure of the upper punch to stop against a step inside the die casing. Of course, this travel is adjustable. The lower punch, toward the end of the downward movement of the die, rises from fill position to travel 3/16 in. for lower pressure stroke. After a short dwell, the upper punch leaves the die, which returns to its original position under spring pressure, and the lower punch raises to eject the briquette.

An interesting cnstruction feature in this floating tool is a Palmetto packing ring around the die periphery to prevent excess powder from getting between the close-



Varying cross-sectional area under flanges complicates pressing this iron powder cam block. Sintered part has tensile strength of 35,000 psi



Cam blocks are pressed at rate of 600 per hour under pressure of 50,000 psi. "Floating" die provides uniform density throughout part including sections where wall thickness varies

ly fitted die wall and the casing. Should this happen, powder would pack up and score the die as well as cause misalignment. A further precaution is provided by annular and longitudinal grooves in the die that break up any powder that might be entrapped.

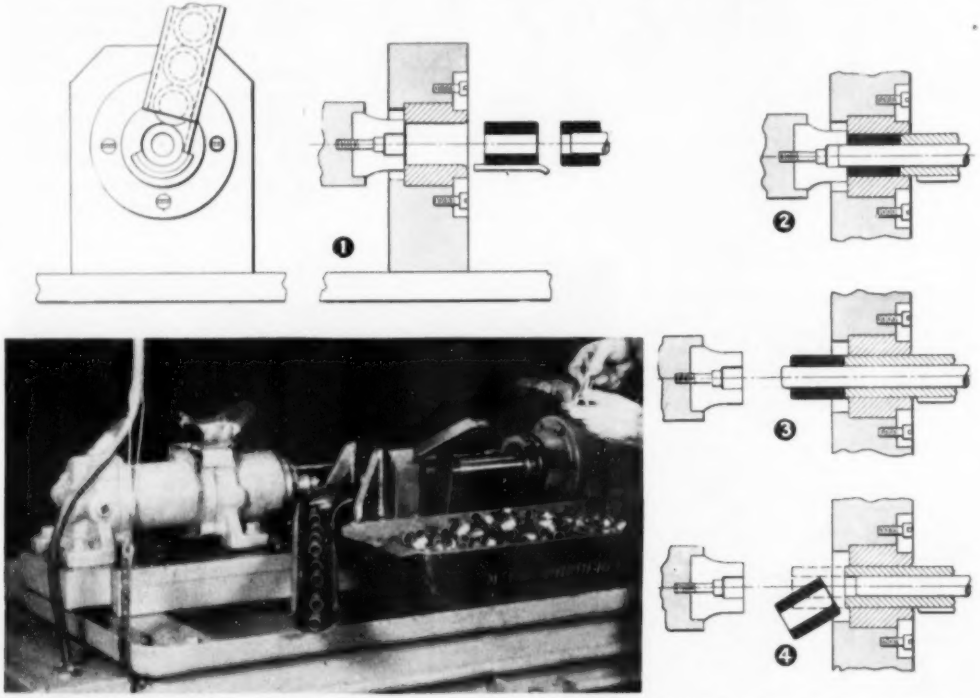
SPECIAL SIZING EQUIPMENT

A SPECIAL patented machine developed in this plant for sizing cylindrical parts to hold close bore and OD tolerances handles 2000 to 3000 pieces per hour. Parts are loaded in a track from which they are gravity fed into alignment with a die mounted midway between two opposed hydraulic cylinders. One cylinder is specially designed with two pistons, each of which has a double stroke. An outer piston has a sleeve at the end to fit the die and an inner piston has a sizing punch at the end, closely fitting the sleeve bore. Opposite piston, aligned with the die and the axis of the other pistons, has a recess to receive the sizing punch. In operation, the sleeved piston pushes the part into the die, sizing the OD while the opposite piston butts against the die to prevent the part from passing completely through.

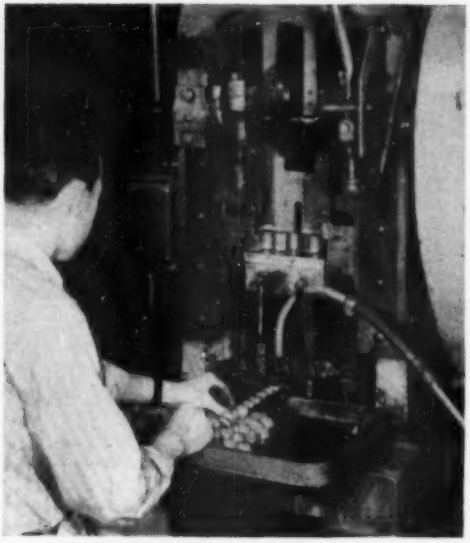
While the pistons are in this position, second stroke of the special cylinder drives the sizing punch through the bore of the part to enter the recess in the opposite piston, thus sizing the ID. The butting piston withdraws as the sizing punch and sleeve advance the part through the die. These members then withdraw and since the part cannot reenter the die it has just passed through because of a small amount of springback, it is stripped off to fall into a track that directs it to a tote pan. Tolerances of ±0.0005 in. are held on both bores and OD's of sintered powdered-metal parts in this machine with consistently high production rates.

BEARING BALLS REPLACE SIZING PUNCHES

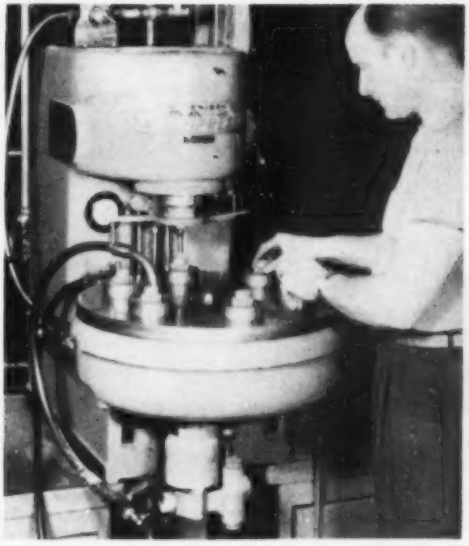
TO REDUCE costs and still maintain quality and high production rates, bore sizing operations, in many instances, are performed with bearing balls. Balls, of course, are cheaper than hardened and



Bore and OD tolerances of cylindrical parts are held to ±0.0005 in. in this automatic sizing machine which produces 2000 to 3000 pieces an hour. Oil-impregnated bushings shown are 1.000 in. long, with 0.6875 in. bore ±0.0005 and 0.8145 in. OD ±0.0005. Operator gages every 10 or 20 pieces. Machine has two opposed hydraulic cylinders with stationary die in alignment between them. OD is sized by forcing work into die by means of sleeve on outer piston of RH cylinder. Adapter on piston at left stops work from passing through die. Punch on inner piston at right then enters work and adapter, sizing bore. Both pistons move to left for ejecting work



Punch-press setup also eliminates sizing punches in holding ID tolerances of shock-absorber rod guides. Balls drop into bores from compressed-air line for sizing parts at a rate of 2500 per hour



Expensive punches are not needed to size bores of copper-iron lawn mower pinions. In this setup, ball bearings, driven through bores, hold ID tolerances of ±0.0005 in. Production rate is 1200 pieces per hour

ground tool-steel punches, do not break, require no maintenance, and are easily replaced when worn.

One setup in which bearings are used is in a Denison Multipress in which parts are loaded in a 6-station dial-feed table. An air hose at one station drops a ball into the bore of a part that was loaded in the die at a previous station. When that part reaches the press ram, a punch drives the ball through the bore of the part, passing through the die and into a hose connected to the ball-feed tube. Compressed air blast forces the ball through this connection and into the feed hose again for re-use. Several balls are kept in the feed hose to maintain speed of the operation. Balls are slightly over standard bearing sizes for this work to allow for springback of sintered parts. Sizing tolerances of 0.0005 in. are held and production rates average over 1000 pieces per hour.

Another ball-sizing setup is maintained in a 10-ton punch press where a production rate of 2500 pieces per hour is achieved. Here work is fed from a hopper to a track that passes under a brush attached to one face of the press ram just in front of the punch. Brush enters the bore of the parts lightly lubricating them and picking up more oil from a pot under the nest in which the parts rest at this point. An air hose between the brush and the punch drops a ball in the bore when the part is advanced to the next nest. The work then passes to the punch which drives the ball through the part, into a hose connected to the feed line and, again, an air blast carries it back for re-use.

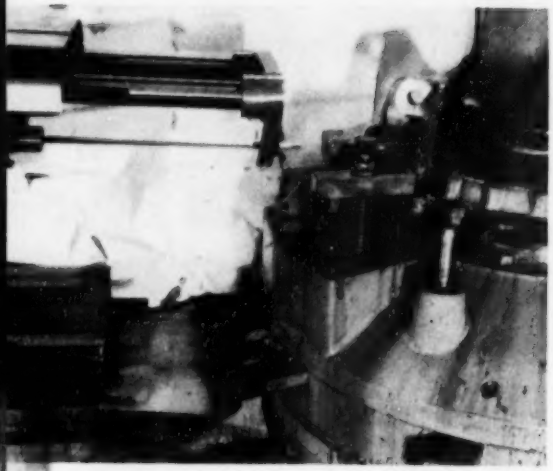
Chrome-Glass Coating on Molybdenum for Jet-Engine Parts

IN THE SEARCH for metals that will stand up at jet-engine temperatures, molybdenum is inviting because of its melting point of 4750 F. But a coating must be applied that will protect it from rapid oxidation.

Research by the National Bureau of Standards has produced a coating of chromium and frit that gives better protection than either chromium or glass alone. Best results have been from a powdered chromium-bearing base coat containing no frit that is fired in a hydrogen or argon atmosphere. This is followed by a ceramic seal coat containing no chromium. This gives better results than mixing the two materials in one or two coats. Addition of a third coat, consisting of a lower-melting glass gives the best results of all.

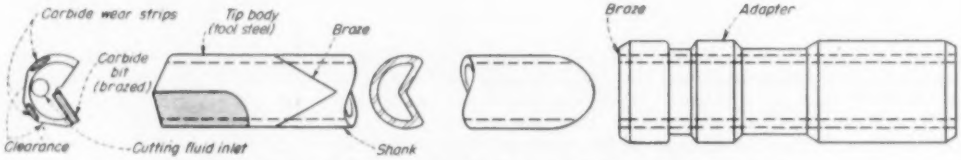
At temperatures of 1500 to 1800 F the coated specimens lasted for 1000 to 3000 hr. At 2800 F with no applied load, protection for as much as 7 hr was attained, which would be valuable for some applications.

Microscopic examination shows that the chromium has a porous structure into which the glass is absorbed during the firing of the seal coat. Although thermal strain and rapid creep tend to cause cracking of coatings, the glassy layer tends to reseal fissures, avoiding rapid failure.



GUNDRILLS are used for many drilling operations, including both deep and shallow holes, because they produce a clean, straight hole regardless of length. Some drills are used in specially designed machines while others are used in standard machine-tools. Except for the shank, drills are not difficult to make, and effective use requires only care (AM—May 26, '52, p109)

HYDRAULIC DRAWBENCH was built especially for roll-grooving shank tubes; piston is controlled by single valve. Handwheel at top of tool-block presses against roll beam to force roller into tube clamped in slide. 1500-lb pressure readily forms ½-in.-dia tube.



TIP BODY, SHANK, AND ADAPTER of gundrill can be individually varied to suit job. This design has proved satisfactory for drilling cast- and rolled-steel parts to close tolerance

"Adapters and carbide drill-heads were no serious problem, but the grooved tubular shanks were another matter . . ." as

GUNDRILLS ARE HOME

BY FRANK G SENTER, Special Machine Builder, Allison Div, GENERAL MOTORS CORP

GUNDRILLS for deep-hole drilling became scarcer than diamonds overnight in one of Allison's manufacturing departments, when the sole source of supply suddenly was cut off. Production of the critical defense item for which they were needed could not be stopped, so with only four spare drills in stock a rush search was made for other sources. None were found.

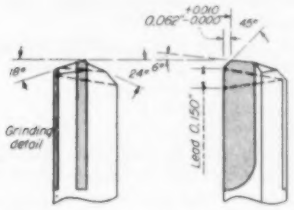
Within ten days, satisfactory gundrills were being turned out by our own toolmakers. Since then, improved drill-production tools and methods have been devised, better drill designs have been developed, and we are now making all of the gundrills we need.

Production of tool-steel adapters and tip bodies presented no particular difficulties. They, easily, could be machined and heat-treated with standard equipment available in Allison's large toolroom, but the grooved tubular shanks were another matter. A tubular shank was necessary so cutting fluid could be fed to the cutting edge under sufficient pressure to force chips back out of the hole, and the shank had to be formed with a large groove along one side to provide passage for the chips.

Our solution was to develop a hydraulic drawbench with which grooves could be rolled into the drill-shank tubes. It has proven entirely satisfactory for grooving SAE-4130 tubes ranging from 5/16 to 1½ in. OD in lengths up to 40 in.

Bed of the drawbench is a 10-in. I-beam 10 ft long.

PRESSURE BEAM, with grooving roller, easily is removed from tool block for inspection or roller replacement by pushing out fulcrum pin which supports one end of beam



DRILL-POINT SHAPE found best for cast and rolled steel parts is 18 and 24°. Tip is sharpened after brazing and polishing.

TUBE SIZES FOR GUN DRILLS

DRILL DIAMETER	FINISHED TUBE OD	TUBE WALL THICKNESS	TUBE STOCK SIZE
0.3125	0.300	0.050	5/16 x 18 ga
0.3281	0.312	0.055	5/16 x 18 ga
0.339	0.326	0.056	3/8 x 15 ga
0.3437	0.330	0.057	3/8 x 15 ga
0.3594	0.340	0.060	3/8 x 15 ga
0.375	0.360	0.062	3/8 x 15 ga
0.4218	0.400	0.070	13/32 x 16 ga
0.4375	0.417	0.073	7/16 x 14 ga
0.4844	0.470	0.081	1/2 x 13 ga
0.500	0.482	0.083	1/2 x 13 ga
0.5625	0.550	0.093	9/16 x 13 ga
0.625	0.607	0.104	5/8 x 12 ga
1.000	0.975	0.160	1 x 3/16
1.062	1.050	0.170	1 1/16 x 3/16
1.500	1.460	0.250	1 1/2 x 1/4

Note: All dimensions in inches.

GROWN AT ALLISON

It is mounted on legs to support it at convenient working height, and has a 3x6x42-in. slide in which the tube to be grooved can be clamped securely in a split holder. The 2x6x60-in. base on which the slide moves is faced with Micarta laminated phenolic plastic to minimize scoring under roll pressure.

Draw pressure is furnished by a 4½-in. bore, 48-in. stroke double-acting hydraulic cylinder connected to a suitable pump. This pump, with its direct-connected 1½-hp 1135-rpm motor, is mounted on top of its sump tank at one end of the drawbench. One 4-way hydraulic valve controls movement of the draw piston.

Roller which forms the groove in the tube is 2-in. OD, 1-in. wide and has an included face angle of 100° with a small connecting radius. Made of tool steel, the roller is hardened to R. 60-62. It rotates on a hard bronze bushing.

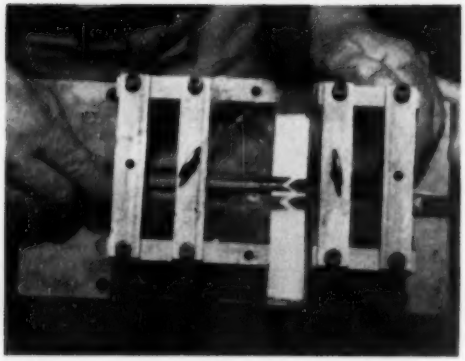
The roller is mounted in one end of a 1¾x8x13-in. beam supported at the other end by a heavy crosspin in the tool block. Roller is adjusted vertically to bear against tube by a heavy screw adjusted by a handwheel on top of the tool block.

Tube holder (different holders are made for each tube OD) is split longitudinally, and a half-round groove is milled along this split in one side of the holder to suit the tube to be clamped. Depth of the groove is the radius of the tube (OD) plus 1/16 in. This insures tight clamping of the tube as it is pulled under the grooving roller. For holders used with small-OD tubes, often it is desirable to have two sizes of tube grooves, one in each side along the split line, to minimize the number of loose tool parts to be made for a series of drill sizes. Holder must be at least as long as the tube to be grooved and preferably a little longer, to insure adequate clamping.

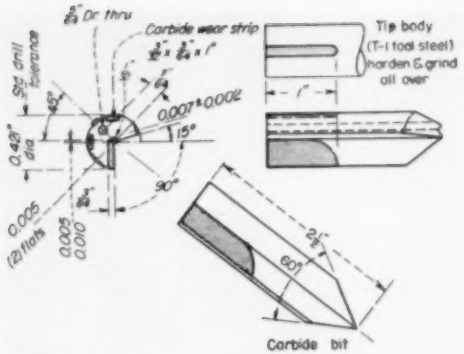
When using the drawbench to roll-form the chip groove in a drill shank tube, the roller is forced down about 0.015 in. before each pass is started (whether forward or reverse) until the desired depth is reached. Then several passes are made without changing the position of the roll. This sets the metal in the groove and minimizes warping of the tube as it is removed from its holder.

Sequence of operations which has been found most satisfactory for forming grooved-shank tubes, and assembling gundrills is:

1. Saw tube to specified length plus ½ in.
2. Tie tubes in bundles of 25 to 30 tubes each, then anneal in furnace to hardness of 0-10R. (soft state). Bundles are placed on end in the furnace to minimize warping.
3. Straighten tubes individually.
4. Centerless grind OD of tube to within 0.001 in. of desired shank diameter, which is 0.010 to 0.015 in. under drill diameter.
5. Roll-form groove in drawbench. About 14



TORCH BRAZING is accomplished economically in a fixture which consists of two heavy V-blocks aligned on a baseplate with a large key, and equipped with clamp bars to line up shank tube and drill-tip body. 60° V-joint has greater driving power than butt



TIP BODY with carbide bit insert and two carbide wear strips brazed in place is left square across end until assembly is brazed to end of drill shank. Dimensions shown are for 0.421-in.-dia drill, but proportion is same for drills to 1½ in. dia

passes are required for a ⅜-in. drill tube. With pump operating at 300 psi, traverse rate is 3 to 4 fpm. Stop on piston rod limits travel toward head end of tube (left round for joining to adapter). Operator lubricates tube with SAE 30 machine oil from oil can as forming proceeds.

6. Cut off ½ in. from tip end of tube; as this end collapses under roll pressure it must be left at least ½ in. longer than needed for full-length shank, then cut off later.

7. Mill 60° V-slot across end of tube for joining with tip body.

8. Restraighten tube.

9. Harden to about R. 48, draw to R. 30-34, handling tubes individually. Tube must be soft enough to straighten easily, yet have sufficient inherent stiffness not to bend under normal drilling pressure.

10. Buff all over, except in groove.

11. Hand polish in groove.

12. Restraighten tube.

13. Insert end of shank in adapter for brazing.

14. Braze shank in adapter.

15. Align tip body (with carbide bit and wear strips already brazed in place) and shank tube in special fixture; join by brazing.

16. Clean off brazing flux.

17. Sharpen drill point.

18. Deliver to tool crib, ready for shop use.

The tool-steel tip with brazed-in-place tungsten carbide cutting bit and two wear strips shown has replaced the solid carbide tips formerly employed. They are less expensive; last just as long.

Tips FOR TOP SHOP MEN

434 Gadgets and services discourage thinking. The radio, TV, the make-it-yourself kit, the service station, the six-easy-lessons offers—all these do men's thinking for them. Be sure you aren't lulled into forgetting how to think for yourself.

435 When you write a report or an article, be honest, not coy. If you did the job, write "I" and "me"—not "the writer". The reader will know anyhow whom you mean, so who are you kidding? If the reader is your boss, he'd better know who did the job; associates will judge you for what you are, not for how you write; outsiders must judge by your writing, and may picture you as an old fashioned so-and-so.

EMPLOYMENT OFFICE
JANITOR WANTED
WAITER WANTED MUST KNOW HOW TO COOK
MACHINIST WANTED MUST BE UNDER 27 YEARS OF AGE WITH MINIMUM OF 20 YEARS EXPERIENCE
Marvin Townsend

SIMPLE FORMED SHEET is removed from die on which it was stretched at North American Aviation. Control console at lower left gives operator full view of operation and instant manipulation of the sheet. Jaws on press are of new curved design which permits shorter grip

Form compound contours . . . Produce larger unit parts . . . Minimize trimming scrap . . . Use soft, annealed, or half-hard sheet, with . . .

NEW STRETCH-FORMING TECHNIQUES

BY FRANK CHARITY, LOS ANGELES, CALIF.

Although the basic stretch-forming process still consists of gripping a metal sheet, extrusion, or similar section at each end with a pair of jaws, then stretching or wrapping it over a die of the desired contour, improved machines and better methods have contributed major improvements. Much of this development has been at North American Aviation, Inc, one of the foremost users.

Stretch presses now available can form sheets of practically all stock lengths and widths conventionally used in aircraft manufacture. Sheet thickness is usually 0.064 in. or less, but 0.250-in. thick stock has been satisfactorily stretched.

Extrusions and formed sections up to 200 in. long are considered suitable for stretch-forming as long as their cross-sectional dimensions do not exceed the maximum jaw-opening of available machine-tools. The largest jaw in current production use opens to about 12 in.

Stretch dies are usually cast from phenol-formaldehyde plastic or from lead or Kirksite alloys. Their design never includes springback allowance, as the stretch of stock is successive. It begins at the point of first contact with the die and proceeds away from that point toward the edges of the stock.

Tools wth numerous compound curvatures have been used for stretching, but formed sections or extrusions usually require stretch dies with single—or extremely slight—two-plane curvatures.

Materials and dies are preheated, in certain cases, to increase the flow properties of the stock. Where it is necessary to work the latter beyond its elastic limit, progressive forming is specified. Then, the stock can be annealed one or several times before it is stretched to its ultimate length.

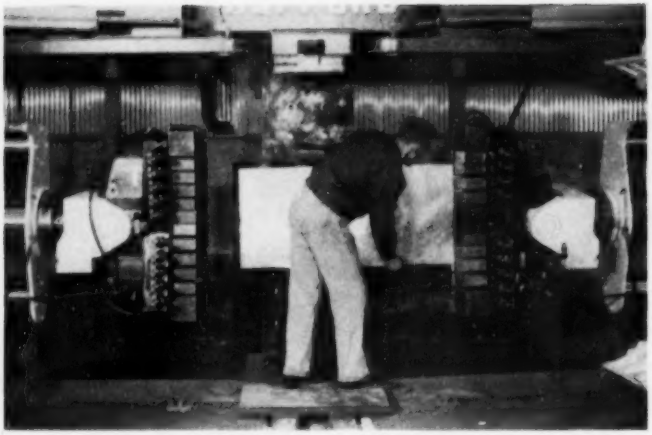
Specific considerations which govern the design of parts to be stretched from sheet stock are:

1. Depending upon jaw design, each sheet should have a 1-in. trim line on all sides, plus a 3 to 8-in. clearance between the die edge and the stock edge (in the direction of stretch). Greater clearance dimensions are specified where saddleback shapes must be longitudinally stretched.

2. Reverse curves are formed at right angles to the direction of stretch (never in line with the direction of stretch), where it is not desirable or practical to produce each curve as an individual part.

3. The most desirable shape for stretching is a convex contour, as saddlebacks are difficult to form unless they are relatively flat or adaptable to longitudinal stretch.

4. For transverse stretching of



LOADING IS EASY. One end of aluminum alloy sheet is clamped between jaws of 150-ton stretch-wrap forming machine; then opposite end is clamped. Forming action is similar to operation of ancient torture rack. Dies are usually cast from phenolformaldehyde plastic or from lead or zinc alloys

saddlebacks, sheet edges should initially contact die surfaces and part-width should not exceed 42 in. to avoid wrinkling (and hand finishing).

5. Sharp bends should be avoided. For example, when stretching sheet into a V-trough, the radius at the trough bottom should be 8 to 10 times the metal thickness. Despite the metal's tendency to slide downhill, frictional drag and the material's strength can prevent satisfactory forming of a minimum bend radius. For a radius under 1 in., stretch-form the part with a 1-in. radius and complete the desired bend with a supplemental press operation using a lead punch and mating die.

6. The tentative limit for longitudinal stretching is a minimum length of twice the part width. However, this factor is only important when parts must be stretched parallel to the grain of the sheet to take advantage of the maximum permissible elongation.

Varied stresses, local friction, and other unpredictable factors make accurate computation of expected elongation and thinning practically impossible. However, the difficulty can be minimized by the use of rough estimates based on empirical test data. For most aluminum alloys, elongation will rarely exceed 14% while reductions in thickness usually average 5% and never more than 7%.

Stretching, like any other forming method, work-hardens the sheet material; thus increases both tensile, yield, and ultimate strengths, while decreasing the potential degree of elongation. Typical values show increases up to 20% for yield and up to 10% for ultimate strength after final heat-treatment. However, North American engineers do not design to the limit of these improvements, as the greater margin of safety is usually desirable in aircraft parts.

For forming extrusions or similar sections, stretching is a particularly important production technique for structural parts, such as half-hard stainless-steel fuselage-frame components and many other parts that heretofore have been manufactured with drop-hammers, mechanical presses, and roll or foot shrinkers. Stretch-forming is preferred because:

1. Springback difficulties are minimized.

2. Sections once built as two or more separate components can be stretch-formed as integral units.

3. Almost any cross-sectional shape can be stretch-formed.

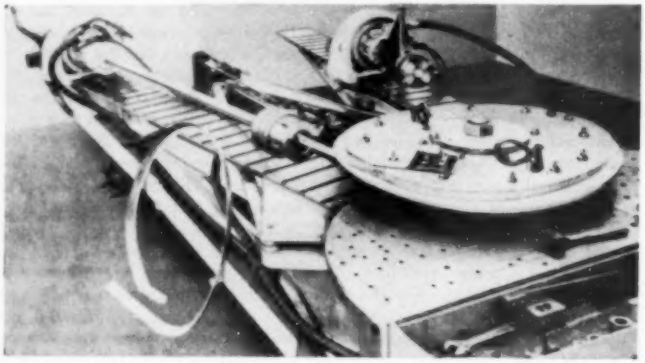
4. Stretched extrusions are more uniform than parts formed with press, hammer, or roll.

5. Angles between legs of a given section can be varied with a stretch die, thus the need for considerable handwork is eliminated.

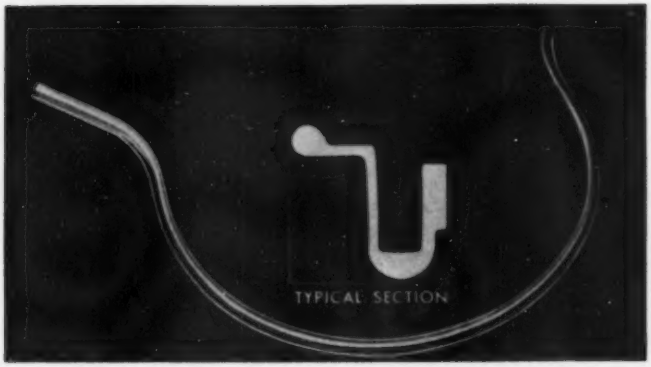
6. Tensile and yield strengths are increased, while elongation is decreased.

However, where joggles or sharp reverse curves are required, stretch forming is only desirable if the extrusions or formed sections are soft enough to be partly formed by means of a mallet and fiber block while each part is under tension on the stretch die.

Parts having an included angle of more than 180° were not practical to stretch-form with equipment available at the end of WW II. With equipment now available, some shapes can be stretch-formed into complete circles. For this, the die is fastened to a drum on which a steel cable is wound. One end



EXTRUSIONS are formed rapidly on this smaller stretch-wrap press. New technique makes formation of complete circles a comparatively easy job



"QUESTION MARK" section extrusion is one of more unusual parts stretch-formed at North American. Use of Cerrobend filler material makes complicated form possible

of the workpiece is clamped to the die and an initial stretch is applied. Pressure is maintained as the drum and die revolve, and the part is wrapped around the die through 360° of rotation.

The most desirable shape for section contour forming is a hat section, either extruded or formed, because of its stability after forming. When released from a die, a hat will not twist, like "L" or "Z" sections, as a result of unbalanced springback. However, springback trouble can be minimized for most forms by careful planning—such as adding material to one leg of a "Z" to equalize stretching stresses in that one leg.

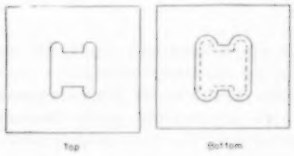
Notch effect is a factor in determining the maximum elongation induced by stretching; hence the direction of flanges relative to the radius of contour. For example, L-sections with heels on the inside of a turn can be stretched only 2/3 as much as the same sections with heels on the outside of a turn.

Reverse curves with radii of several inches can be formed on sections where it is possible to pull the press arms around a die for each major curve. Thus, die blocks can be added to change the direction of pressure.

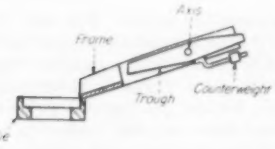
As a rule, the main legs of an extrusion or section are placed in the plane of curvature so they will be fully supported by the die as they are stretched. However, when this is impractical, filler materials such as "Cerrobend" can be poured into hollow areas between legs (or into the center section of an extruded tube) to prevent wrinkles and other defects from developing during stretching.

DIEMAKERS KINKS

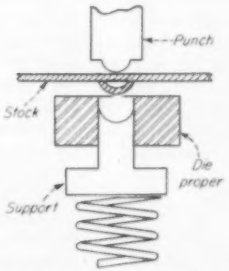
BY FEDERICO STRASSER



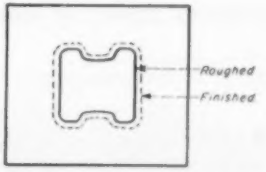
BLANKING or punching opening in dies should be laid out on both the top and bottom surfaces, to provide a better guide for filing. The bottom opening, of course, must be larger to provide angular clearance.



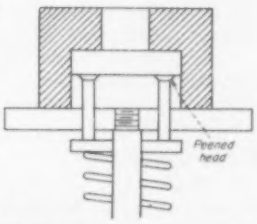
SLIDE FEEDS for second-operation drawing or forming dies should be fool-proof. To avoid feeding two pieces at once, provide a pivoted trough down which the blanks are constrained to slide. If the counterweight is set so that more than one blank causes the trough to tilt, it will do so and the blanks will fall harmlessly onto the press table and not into the die.



IN SLITTING or lancing dies, where a portion of the metal is drawn away from the stock, it is necessary to provide an elastic support for the metal.



ANNEAL die plates for precision tools after the opening has been roughed out. This practice will relieve any internal strains in the metal, and avoid distortion during hardening.



SHEDDERS are usually connected to their spring or rubber pad by cylindrical pins. To prevent these from falling out when the pad is removed, peen their heads.

UNBONDED AREAS in honeycomb panel are revealed by pattern of sand grains on surface. When sound waves strike panel, vibration of loose sections causes sand to move into typical pattern shown above

SONIC TESTER CHECKS BONDING

Dancing grains of sand outline unbonded areas of honeycomb panels in new sonic

BY H O WILLIAMS, Chief of Quality Control, Santa Monica Division, DOUGLAS AIRCRAFT COMPANY, Santa Monica, Calif

AN accurate and positive method of testing for unbonded areas in honeycomb panels has been developed by Douglas Aircraft Company. The new device, a sonic tester, has reduced testing time by more than 50%.

As previous methods of testing were time-consuming and inaccurate, the inspection department at the Douglas Santa Monica Division was instructed to devise something better. At the suggestion of Dr A L Klein, design consultant, and with the help of sound engineers, W C Hitt, assistant to the chief inspector, and Al Barath, inspection process engineer, the possibility of testing the honeycomb panels with the resonance induced by sound vibrations was explored.

Violent Violin

The power of sound transmitted to a vibratile surface is surprising. Everyone has heard of window panes shattered by the note of a violin and the wine glasses broken by Caruso's voice.

A less-spectacular experiment in high-school physics books is based on the effect of loose sand on a vibrating surface. Grains tend to become arranged in patterns coordinated with the nodes and loops described by the vibratory movement of the material. The sand, disturbed by high-frequency oscillation, is drawn away from more intensely vibrating areas and aligned in zones of comparative quiet.

Hitt and his associates accordingly supported the panels to be tested over a trumpet, at the other end of which was a source like the electronic tube of an electric organ. This was tunable from 16 cycles per second, the deep hum of a diapason, through middle C at 256 cycles, to a squeal to 50,000 cycles, far beyond voice range—indeed, too high to be heard by human ear.

"It was like a mechanical larynx," Hitt said, "far better than having a mixed quartet under the table. To hit the necessary high notes, a quartet would need the auxiliary aid of a policeman's whistle and a 'soundless' dog call. Besides, no natural voice can hold the steady tone electronically produced."

During the experimental stage, sand grains were colored according to six sizes to see if a big grain would move faster than a small one. No appreciable difference was found. In fact, dust swept up from

SYMMETRICAL PATTERN of sand grains occurs when the pitch is tuned in resonance with the fundamental key of the whole panel. Vibration induced by imperfectly bonded areas is damped out and pattern corresponds with central segments of the vibrating structure

OF HONEYCOMB PANELS

testing device developed by Douglas. Inspection is positive and twice as fast

the floor probably would have worked for the test.

When the experiment was first set up, the musical effect that made the sand dance, although shrill enough to compel nearby workers to use ear plugs, was scarcely noticed above ordinary factory noises.

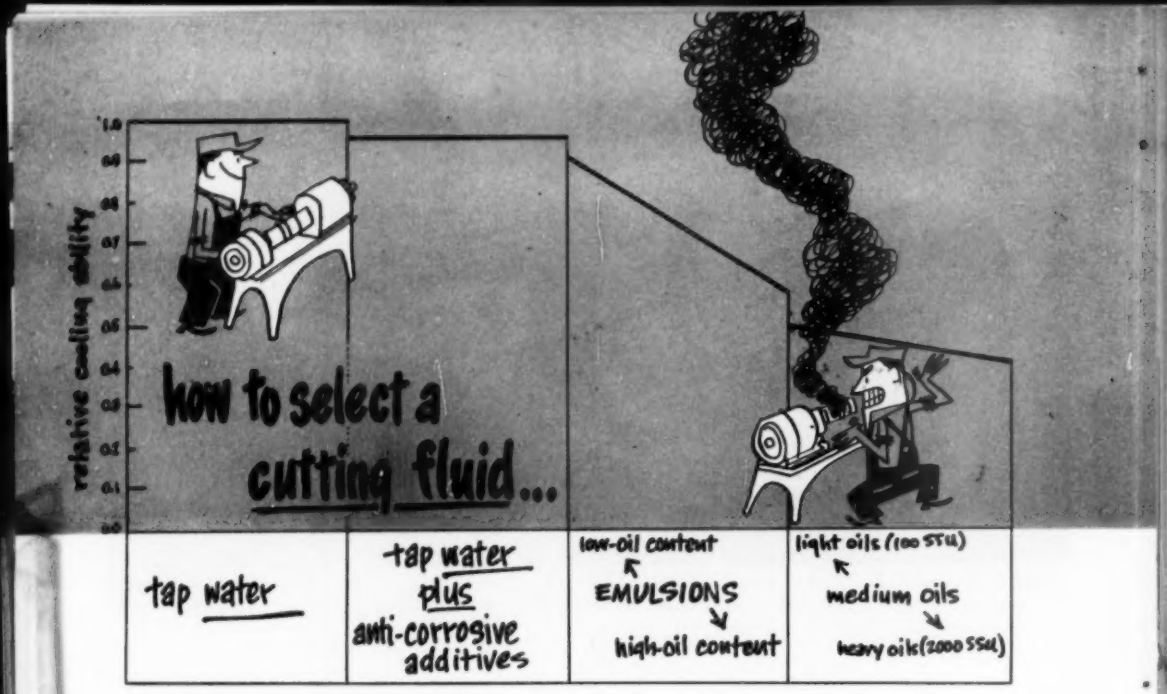
Meanwhile at the proper note (determined by the operator who regulated the pitch the sand started jumping on the table, moving away from areas beneath which the honeycomb was not attached to the sheet metal. These areas were outlined with chalk and when the panel was dissected later, unbounded areas were found as the chalk marks indicated.

Fast and Sure

It now takes not more than ten or fifteen minutes to test panels on both sides. Previous guesswork has been eliminated and positive inspection assured.

In the course of the test it was found that sound waves of about 20,000 cycles are best for starting the operation, but this varies with the size of the panel to be tested. The pitch is then lowered until movement of the sand away from the unbonded areas is observed.

CONTROL OF TEST is accomplished from outside soundproof room in which panels are vibrated. Cyclage depends upon panel size



As a coolant, water is superior to any other material.* Tap water is therefore the best cutting fluid where high cooling is required. But tap water is so corrosive that it can be used only where rusting of the machine tool and work can be tolerated. Following water in cooling ability, in order of decreasing efficiency, are water-oil emulsions, low-viscosity oils, and high-viscosity oils. The headpiece illustrates this relationship between commonly used materials.

As the cooling ability of a fluid increases, less of the heat liberated in cutting is allowed to raise the temperature of cutting tool, work, and machine tool. This property is important because all tool materials lose hardness as temperature rises. Greater cooling ability of the cutting fluid permits either increased tool life, or increased cutting speed. From the machine-operator's viewpoint, cool work is always desirable because it reduces the inaccuracies from expansion of machine parts. For materials with high coefficients of expansion, such as aluminum, a coolant will reduce errors caused by work finished to size at elevated temperatures, which then shrink below tolerances at room temperature.

Generally, a high cooling rate is desirable in a cutting fluid, but a coolant may be *too* effective. This is possible with some steels when temperatures developed in the work just ahead of the cutting tool are above the critical temperature and the coolant is so effective it quenches the work before it reaches the actual tool-work junction. For example, the work may be an annealed high-carbon steel, but the actual chip area at the tool-work junction may be hardened by the quenching rate of the cutting fluid, causing very rapid tool failure. It may be possible to correct this condition by increasing cutting speed, so the hot section ahead of the tool passes over the tool tip in too short a time to permit quenching to a hardened structure; or if this fails, to use a cutting fluid that is a less-effective coolant.

The second most important property of a cutting fluid is its lubricating effect. The fluid, as a lubricant, has an effect on the machine in sharp contrast to its effect on the work-tool junction. Sometimes because of machine design, sometimes because of the inaccessible location of some machine elements, but usually because of sheer carelessness on the part of the operator, a large part of the lubrication of machine parts must be supplied by the cutting fluid. Fluids made with oil as the base are excellent lubricants.

"Oil-type" fluids are either straight mineral oils or mineral oils plus additives. These additives may give to the oil either wetting ability, an extreme pressure (EP) effect, or a polar compound to assure that the oil adheres to the metal parts it covers. When oil-water emulsions are used, it is necessary to make certain that the emulsion has an adequate lubricating effect. Emulsions in normal concentrations contain only 3 to 5% of oil, so lubrication with them is quite a problem. This is almost identical to the problem of preventing corrosion when using water-emulsion fluids, so will be discussed with corrosion prevention.

In contrast, no precise information can be given on the lubricating effect of any cutting fluid at the tool-work junction. There is very serious question

*Refrigerated cooling systems provide a much higher degree of cooling. Carbon dioxide, which changes state in application, is popular because of its low cost and ease of application.

"The properties of cutting fluids may be varied by altering their composition so they are useful for a large number of applications. In some cases it is necessary, however, to use a compromise composition to obtain the most desirable combination of properties."

BY THOMAS BADGER
Materials Engineering Department
WESTINGHOUSE ELECTRIC CORPORATION
EAST PITTSBURGH, PA.

as to whether any lubricant ever reaches the critical area of metal-to-metal contact between tool and chip. In ordinary shop practice, the lubricating effect of any fluid on the tool-chip interface is about as effective as pouring a crankcase oil over the cylinder head is effective in lubricating the piston within.

Careful research has shown that minute quantities of various fluids act as lubricants if carefully introduced to cover the tool-chip interface, and this effect makes possible a great increase in cutting speed for a given tool wear. On a laboratory basis, it has been possible to introduce a lubricant into the actual tool-chip interface, and this results in a very great increase in cutting efficiency. Methods of accomplishing this in the average machine shop are in the late stages of commercial development.

Another important property of both oil and emulsion type fluids is the "EP effect". This effect is given by an additive popularly described as increasing the film strength of an oil, but in a cutting fluid such additives are best described as "anti-fluxes". That is, they act to prevent welding between tool and chip under normal cutting conditions of heat and pressure. The most usual anti-fluxes are sulfur and chlorine compounds. These are most useful in operations such as threading or broaching where speeds are slow, tool-chip pressures are high, and the operation prevents an adequate bath of fluid to carry away the heat generated.

Although the EP effect is very effective in oil- and emulsion-type bases, the EP efficiency of the emulsion base decreases rapidly as the base is diluted with water. On the other hand, the EP effect of an emulsion increases as it is used, because the decomposition products of the oil are good EP compounds.

Although corrosion to the work and machine is no problem with oil-type cutting fluids, it is a serious problem with water-base materials. Water is an active corrosion agent, but corrosion can be alleviated in two ways; first, it is necessary to formulate the soluble-oil base so the pH of the emulsion will be high enough (over 7) to reduce rusting of ferrous materials, but not so high (over 10) it causes corrosion of aluminum and some other non-ferrous alloys. A pH of 8.5 to 9.5 is a good range. Second, and more important, the emulsion must leave a protective film on the machine and work to avoid atmospheric corrosion. If this film excludes atmospheric moisture and oxygen, no corrosion can occur. Mineral oil is probably the best and cheapest protective film to provide this effect.

To assure that a film of oil from the oil-water emulsion will adhere (or "plate-out", as it is frequently called), to the machine and work, it is necessary to have present a polar agent. A polar agent is simply one that attracts and retains a thin film of oil to a metal surface. Such a film of oil will not only act as a lubricant, but will also prevent corrosion, as explained above. In the past, soaps and natural fats were used as polar compounds, but modern cutting fluids include chemical compounds that are more effective, do not turn rancid, have no offensive odor, and are not rendered ineffective by hard water.

Several properties of a cutting fluid appear to be of minor importance, yet are required in every cutting fluid. The material must not be a health hazard to the machine operator. It should be bland in its effect on the skin, should not support bacterial growth, and should not give off toxic gases. The material should be stable in storage, and if an emulsion type it must form an emulsion with simple mixing, so complicated mixing apparatus will not be re-

rules of thumb...
FOR CUTTING-FLUID SELECTION

USE AN OIL, if the tool edge removes less than 1 cu in. per min. of steel, or less than 2 of free-cutting materials like brass or aluminum, or ½ cu in. per min. of high-tensile or high-alloy material

USE AN OIL-WATER EMULSION, if the tool edge removes over 2 cu in. per min. of steel, or over 4 of brass or aluminum, or over 1 cu in. per min. of high-alloy or high-tensile materials.

FOR RATES BETWEEN, either or both types will work

Note: These rates may be affected by the need for corrosion protection, or because of smoke, or danger of fire—see text.

quired. The residue left on the work by the fluid should be removed easily by an alkali-water wash. This is particularly important when the parts are to be welded or plated later.

Newer synthetic organic emulsifiers have many advantages when used either alone or as emulsifiers for cutting oils, but care must be exercised in their use. If these emulsifiers produce an emulsion that is too detergent, the emulsion will remove the lubricating-oil films on the machine ways and gibs so mating parts will "freeze" from lubrication failure. Fluids that are highly detergent have very low surface tensions, and this will cause cutting fluids to "creep" through bearing seals into the gearcase or bearing shells. This can cause gear or bearing failure. Care must also be taken that the cutting fluid does not create a fire hazard. For example, low-volatile oils such as kerosene create explosive vapors that can be ignited easily by a hot chip.

Usual steps in determining the composition requirements of a cutting fluid for any application are shown in Table 1. The basic decision is to determine the cooling ability required of the fluid. Using the principles given above on the relative merits of oil and oil-water emulsions as cooling mediums, one of these two basic types must be selected. The amount of heat generated in cutting depends on the volume of metal removed per minute and the shear strength of the metal. Handbooks on metal cutting give formulas necessary to measure the horsepower required to cut metal and convert this power expended into heat units. But selecting a fluid on this basis is not practical except as a research project.

Here is a fair "rule-of-thumb." If a tool edge removes less than 1 cu in. of mild steel per minute, an oil will provide adequate cooling ability. If a tool edge removes over 2 cu in. of mild steel per minute, an oil-water emulsion type is required. For metal removal rates between 1 and 2 cu in. per minute, either or both types will work. For free-cutting materials such as brass or aluminum, double the above values. For high-tensile steels or high-alloy materials, halve the above values.

Check Secondary Factors

After this basic decision is made, it is only necessary to check each of the secondary factors to see if the basic selection covers all necessary factors. If none of the secondary factors conflict, the basic selection is good. But sometimes a secondary factor is important enough to alter the basic selection, as the following examples illust rate: An oil-water emulsion may be desired on a heavy cut on a low-carbon steel part, but the part may occasionally be stored under difficult conditions for several weeks before the next operation and the oil-water emulsion may fail to give satisfactory anti-corrosion protection during this period. An oil type would be substituted here to give sufficient protection against corrosion.

Again, an oil might be desired for its lubricating and extreme-pressure advantages, but the work speed might be so high it prevents the oil from flooding the tool-work area. In such cases, the oil tends to be thrown off the work and smoke badly. The oil spray and fumes are distasteful to the operator at best, and may be a health hazard. In such cases, the original selection of an oil would require a change to an oil-water emulsion to eliminate these difficulties. Another example might be the selection of a cutting for magnesium. Here the only requirement is cooling, so an oil-water emulsion would be the basic selection. But hot magnesium chips react violently with water. This fire hazard makes the use of an oil for cutting magnesium mandatory. After the basic decision has been approved or modified by a consideration of the secondary factors covered in Table 1, the next problem is proper application.

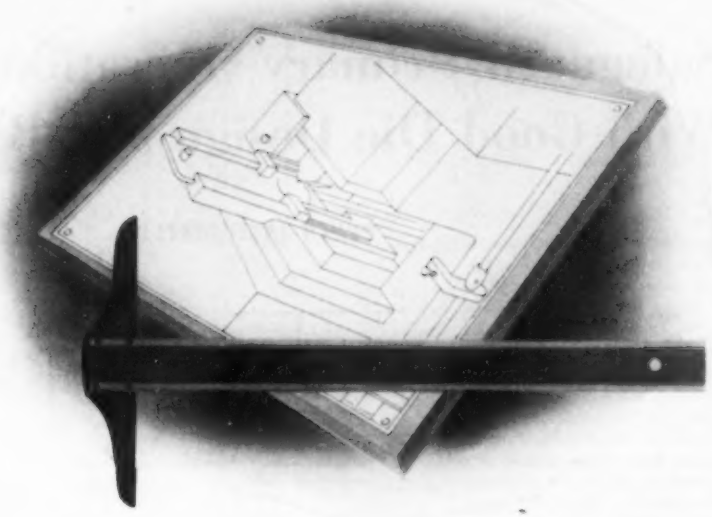
table 1 . . **STEPS IN SELECTING A CUTTING FLUID**

1. **BASIC DECISION: COOLING ABILITY REQUIRED**
   - a. Oil type for low cooling power
   - b. Emulsion type for high cooling power
2. **SECONDARY FACTORS FOR EACH TYPE**
   - a. Lubricating ability
   - b. EP properties
   - c. Polar effect
   - d. Corrosion protection
   - e. Health hazards
   - f. Ease of removal
   - g. Detergency
   - h. Fire hazards
3. **FINAL SELECTION, BASED ON STEPS 1 and 2**
4. **PROPER APPLICATION**

No matter how carefully the fluid itself has been studied, the fluid will be no better than its application. The fluid must intimately flood the tool-chip-work area with a flow sufficient to get into all rubbing areas, remove the heat generated in cutting, and flush the chips away from the cutting zone. The common practices of either directing the cutting fluid on the work a few inches away from the tool and expecting the work to carry the fluid to the tool-chip area, or applying the fluid in a thin stream, should be avoided.

An old maxim providing a flow rate of 5 gpm directed on the tool-chip area is good, but laboratory work has demonstrated that a flow rate of 2 gpm directed by suitable fixtures into the actual tool-chip area is far better. For example, a test was made on a 1-in., 8NC diehead threading forged bolts. With the usual setup of coolant piping and a 6-gpm flow of oil-water emulsion applied where the work entered the diehead, production was 450 bolts per tool grind at 23 rpm. On the same operation, with the coolant piping placed inside the diehead so the fluid flooded the actual cutting areas, it was found that a 2-gpm flow permitted production of 450 bolts per tool grind at 68 rpm—three times as fast.

Reasonable property compromise and proper application will eliminate most shop difficulties with cutting fluids.



Don't Overlook Operator Safety in Press-Tool Design

By L. A. FAULKNER, Supervisor, Industrial Plant Service, Liberty Mutual Insurance Company

Much has been written about design of press tools, but very little on how the die designer can contribute to making these tools safe. Yet the punch press is a prolific source of accidents. Regulations concerning its use are constantly being made more strict by state regulating bodies.

The problem of making press tools safe is simplified by thinking in terms of "point of operation" guarding. Strip, coil stock or first-operation blanks must be fed into a die and the finished part ejected therefrom. Meanwhile the punch is always ready to cut flesh and bone, as well as metal, if inadvertently tripped.

Point of operation guarding simply means: design press tools and provide devices so that the operator has no excuse to reach into the danger zone. Then make doubly sure of his safety by providing a suitable press guard or die barrier.

What the press tool designer should do depends upon the nature of the operation. Feeding methods for a first-operation die may be much simpler than for a second-operation tool. Stripping and part ejection must be studied to avoid any necessity for the operator to reach into the die to remove parts or scrap. Second-operation work is more involved. Further, it is a 4:1 greater source of accidents than first-operation tooling.

The practices outlined and "tricks of the trade" portrayed have been applied in many shops, large and small, throughout the country. They have been instrumental in establishing greater safety and a sharply lowered incidence of pressroom accidents. Accidents are costly. This needless expense and resultant suffering can be avoided by simple precautions in die design and the provision of guards. These modifications need not penalize production and they are not necessarily expensive. The best way is the safest way and usually raises operator output.

American Machinist SPECIAL REPORT NO. 317 TO THE METALWORKING INDUSTRIES

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Safeguard Primary Operations With Good Die Design and Barriers

ALMOST 20% of accidents in presswork arise on primary operations—blanking, piercing, parting, corner cutting, progressive die work and simple compound dies. Such operations are normally conducted with strip or coil stock. The operator is not required to put his hands into the danger zone under the punch. Nevertheless, accidents arise from these causes:

1. In feeding strip to a blanking die, the operator retains his hold on the unfinished end until he actually passes it into the space between the punch and die.

2. An operator uses his hands instead of a pick to remove scrap material caught in the die or a finished part stuck to the punch or die.

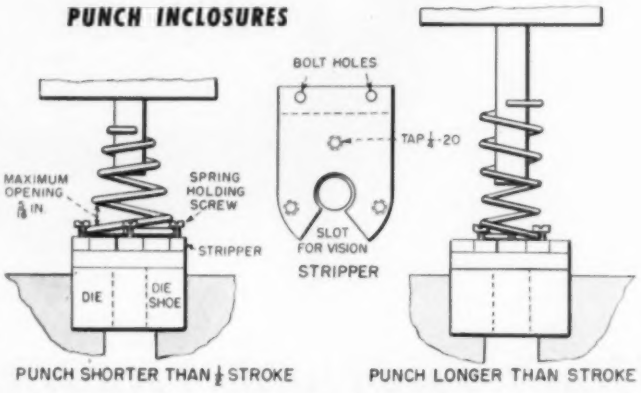
3. Operators may feel the punches to check their condition or reach through the die to remove scrap from the rear of the bolster plate.

4. And believe it or not, the most common cause of accidents on primary operations is from inadvertent placement of hands in the die when leaning over to pick up something or when distracted from the job in hand.

Importance of Strippers

In any program to design more safety into blanking dies, consider the stripper first. A plate-type stripper prevents the stock from sticking to the punch and can be designed to act as a guard. On short-stroke presses, a wide or thick stripper provides the necessary protection, because the punch does not leave the stripper on the upstroke.

When a combined pressure plate and stripper plate is installed on the die, the stock and part being processed are automatically raised to the top of the die on the upstroke, avoiding the need to reach



Springs surrounding piercing punches keep fingers out of the danger area, if coil spacing is less than 5/16 in. Use a conical spring if punch length is less than one-half stroke, because this type of spring telescopes to wire dia. Retain and locate spring on stripper plate with three screws

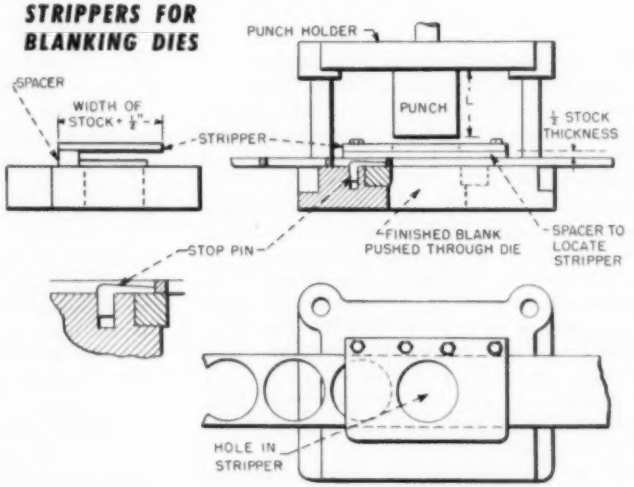
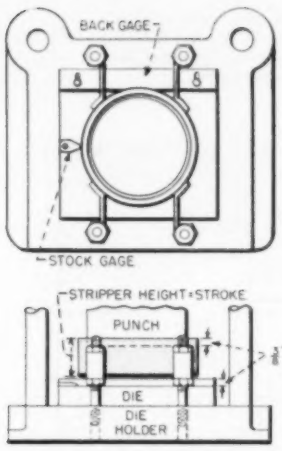
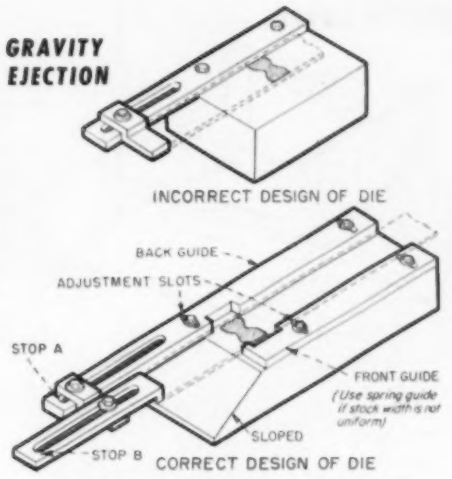


Plate strippers are the first safety factor that should be considered for blanking dies. Adequate protection can be provided if stroke is less than 1 in. or can be adjusted to less than 1 in. Often punch does not need to leave stripper, but if it must for some reason, the clearance at top stroke should not exceed ⅜ in. Punch length *L* must exceed 2 in. to eliminate shear hazard between bottom of punch holder and top of stripper



Shaped stripper-guard made of bar stock on edge protects and at same time affords visibility when blanking light-gage material. Example of use: blanking lithographed stock where careful indexing is required, and punch length exceeds press stroke by 1 in. If stripper is mounted ⅜ in. from top of die, it should extend ⅝ in. above bottom of punch at top stroke. Also supply feed table to enable operator to control horizontal movement of stock



Cut-off dies should have the ejection end sloped so that piece falls readily from tool. Thus, operator is not required to reach into danger zone. Nevertheless, it is good practice to attach a barrier guard to the die shoe. Stop *A* is slotted for adjustment to long parts; stop *B* is slotted for adjustment to short parts, and this stop can be replaced with other shapes and sizes to suit conditions

into the die. An air-ejection device then helps to get rid of the piece, or the press is inclined and the part falls by gravity through the throat of the press and into a tote box or onto a conveyor.

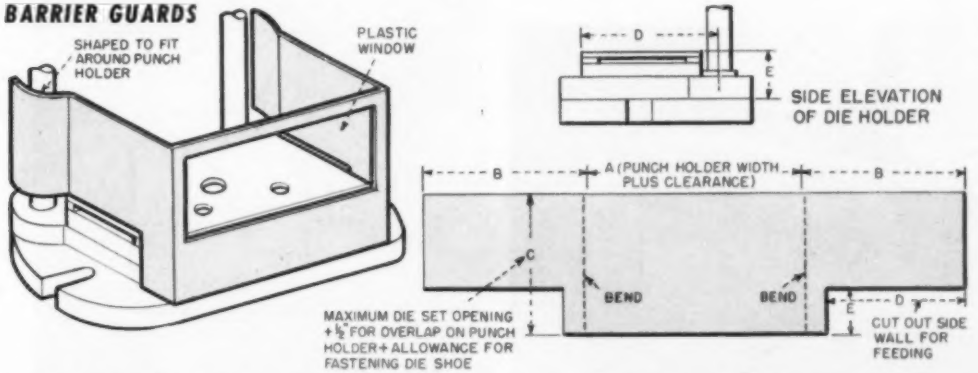
Feeding Methods

Primary operations are normally run with random lengths of strip or coiled stock. Strip is usually fed manually. Feed tables eliminate unnecessary motions, and allow the operator to move the stock ahead with minimum effort if the table height is correctly adjusted.

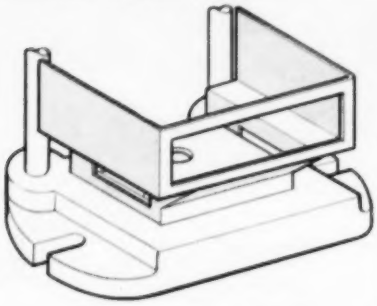
When coil stock is used, a stock reel and either roll feed or hitch feed are employed. In cases where the roll feed is disconnected a feed table used with the stock reel helps the operator to back-gage the stock efficiently and to feed it to the die with minimum effort.

Lubrication Methods

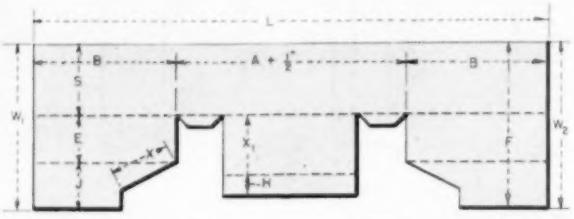
If oiling rolls or pressure guns can be used, the chances of accidents when applying lubricant with a paint brush are avoided. Automatic or manually controlled pressure guns can be provided for



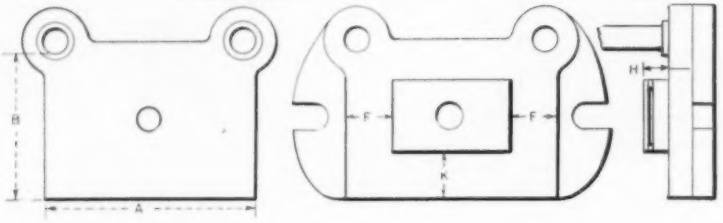
Straight-sided die guards can be formed from 24-ga sheet metal when the slide, punch holder and die shoe are the same size. The guard is fastened to the die block or die shoe and remains a part of the die at all times. It should be mounted with spacers to give 1 in. clearance between front of guard and any projecting breech-block nuts. Templet layout will be helpful, but remember that the guard must prevent hands from reaching over, under or through it. The front opening is fitted with a plastic window, slotted steel or vertical rods to provide visibility



A shaped sheet-metal barrier is necessary when dimensions of the ram plate, slide or punch holder exceed those of the die block or die shoe. Fasten the guard to the die block or die shoe with angle plates



$L = 2B + (A + \frac{1}{2}")$
$W_1 = S + E + J$
$W_2 = S + F + J$
$S =$ PRESS STROKE $+ 1"$
$X = X_1$



lubrication of the punch and die without much expense.

Guarding Systems

The die designer has a distinct responsibility with respect to the safeguarding of primary operations by means of die guards and press barriers. The operator does not need to place his hands in the die between the punch and die. Hence, the means should be provided to make it impossible for him to do so.

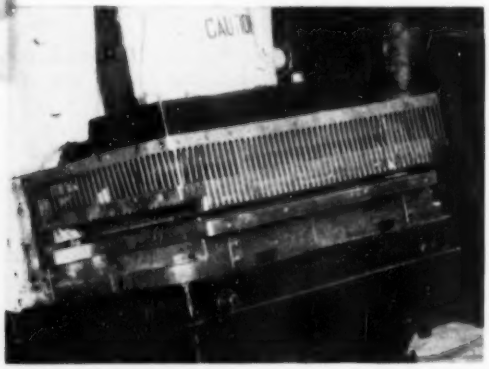
Guards are of two kinds: the *die guard*, which is a device permanently attached to the die; and the *press barrier*, which is attached to the press itself, and is adjustable by the die setter.

Individual die guards provide the most positive protection for the operator. They should be attached to the die shoe or stripper in a fixed position. The design should be such that the operator cannot reach over, under or around the guard and into the danger zone. In building this type of protective equipment, it is important to provide easy feeding of the stock and good visibility of the die at all times.

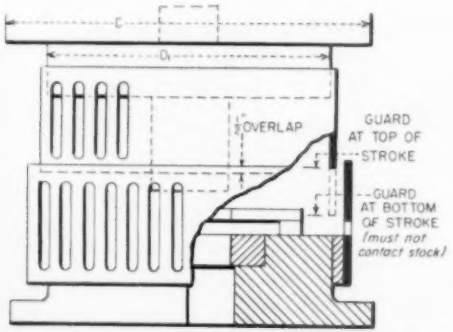
Adjustable Barriers

If a program to equip dies with individual guards will take some time to complete, or short-run tooling is being used, provide an

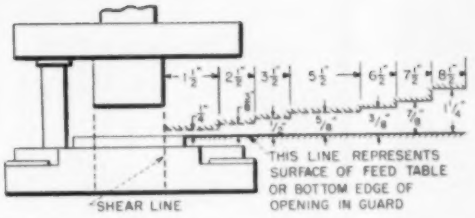
(Text ctd on page 126)



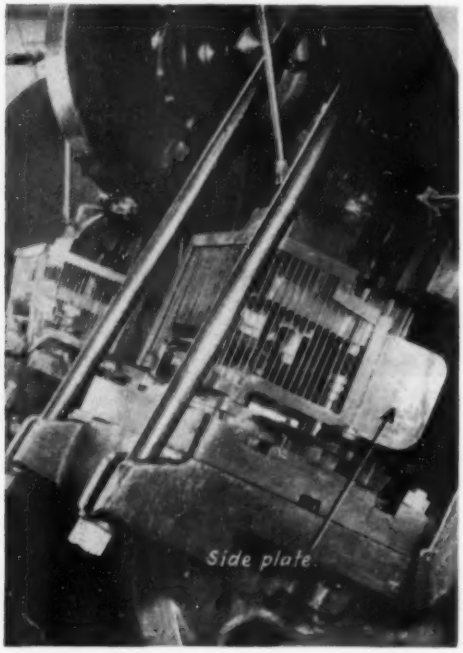
Prefabricated stock makes an effective shaped guard for a large die. The operator is completely protected against putting his hands in the danger area, but he has good visibility without eyestrain



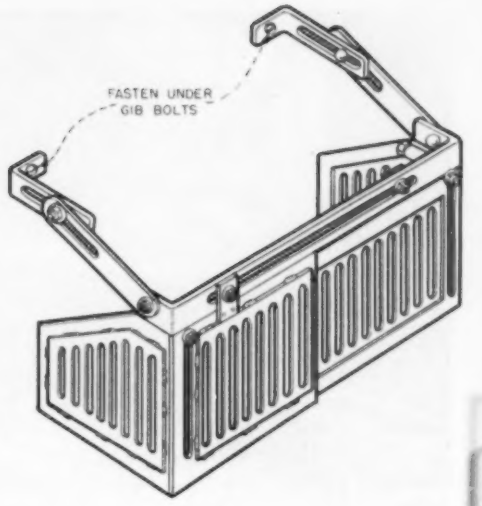
When tools must be changed often from press to press, consider a basic die guard that will provide protection with a minimum of change. When the length of the slide or ram *D* is greater than the length of the punch holder *D*, and the die shoe is the same length as the punch holder, a close-fitting die guard can be constructed in two parts. One section is installed on the punch holder and the other section on the die shoe

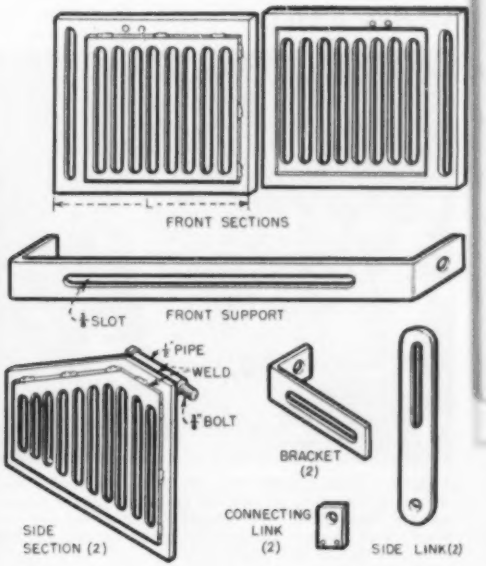


Safe openings in press guards bear a direct relationship to their distance from the "shear" line (where punch enters front of die). Vertical dimensions of the openings are based on preventing the operator's fingers reaching the shear point, even though guard contact is on back of fingers, hand or forearm. When installing guards with openings over ¼ in., make careful tests with operators, especially women, to make certain the guard is effective. Recommendations apply to vertical openings in guard, such as visibility slots, clearance slots for ejection devices and stock gages, and to all horizontal openings for feeding stock from front or sides and ejection of finished parts or scrap. Guard rear of die on presses of the straight-side type

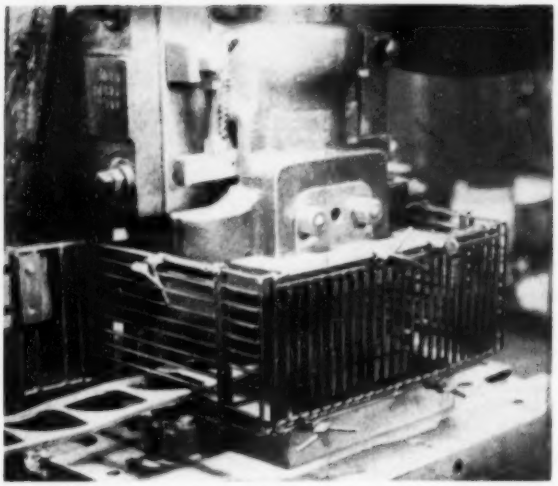


Side plate welded to vertical-rod guard prevents operator from reaching around and into the danger zone. Good visibility of tools is secured from this type of barrier

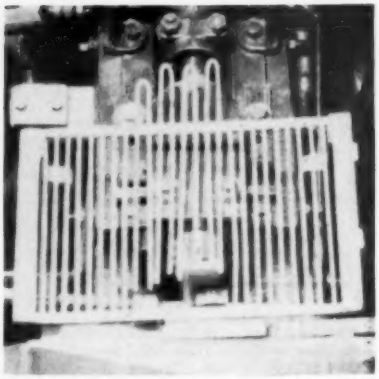




Adjustable press guards are used with temporary or short-run tools, with sub-standard individual die guards for additional protection, and as a stop gap when individual guards are to be built on a long-term program. The barrier is attached to the press gib bolts, and the die setter adjusts the vertical and horizontal positions, also swings in the side plates so operator can control his stock at a safe location relative to the danger zone. Front and side sections are adjustable. This type of guard is used for blanking and other operations where the stock is long enough to be manipulated outside the barrier

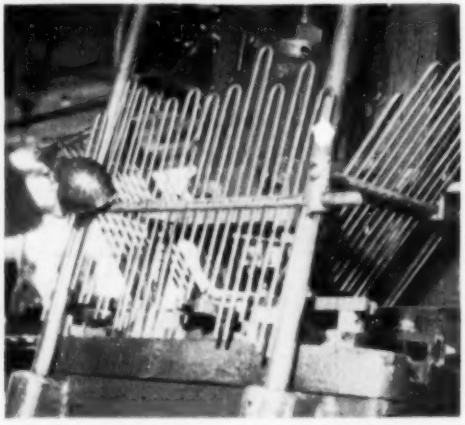


Welded rod stock can also be used for an adjustable barrier. Rods at front are vertical for visibility; those at sides are horizontal for easy passing of strip through die

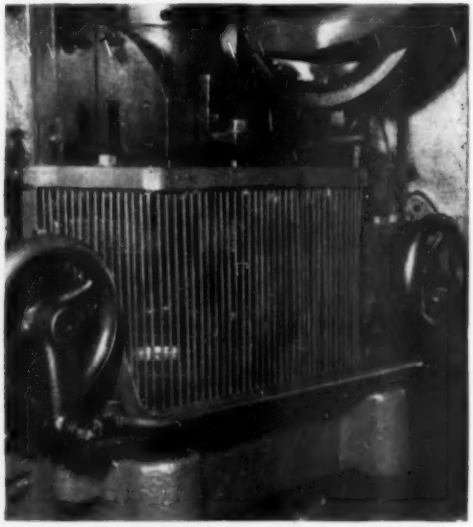


Hairpin-shaped rods can be adjusted to suit stock feeding. They are fastened with setscrews

FEEDING DEVICES



Angular adjustment of the side frames allows closer control of strip stock without the operator's fingers getting into the danger zone. Vertical adjustment of the hairpin-shaped rods at front provides clearance for the parallels on which the die is mounted

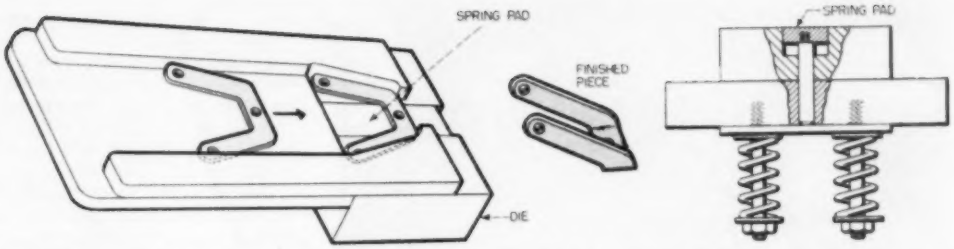


Roll feeds (also hitch feeds) should be protected. They constitute sources of potential injury to operators. Also, it is well to protect such devices from unauthorized adjustment or tampering by operators. Require that servicing be performed by die setters or other qualified personnel

adjustable press barrier on each machine used for such work. Die setters must be thoroughly instructed with regard to proper adjustment to prevent the operator from reaching into the danger zone. Operators must be forbidden to make any adjustment of the barrier at any time.

Combination Guards

Sweep guards, pull-back guards, two-hand trips, etc., are generally not applicable to primary operations. These generally require the operator to hold the stock during the downstroke of the ram. Exceptions are combination gate and barrier guards that are adjusted to allow the operator to hold the stock and use the treadle.



Gravity feeds are among the simplest devices for keeping the operator's hands out of the danger zone. Complete protection is assured by addition of a barrier inclosure. Device shown is used with inclined press. To avoid need for operator to reach into die to remove piece, the spring pad brings piece to top of die and it slides through the narrow opening. If the press is not inclined, supplementary air ejection will be required

Secondary Operations Offer Profitable Opportunities for Accident Prevention

APPROXIMATELY 80% of punch-press accidents arise on secondary operations—bending, forming, embossing, coining, pressing, etc. The hazard arises from the practice of handling material directly under the punch. The first consideration of the tool designer should be the possibility of combining two or more operations into one progressive die. This is an important safety measure that is often overlooked. When many parts are to be processed in one die, the designer should provide a feeding device which eliminates any need for the operator to put his hands in the danger zone. Then by further provision of a suitable guard, the operation is made completely safe.

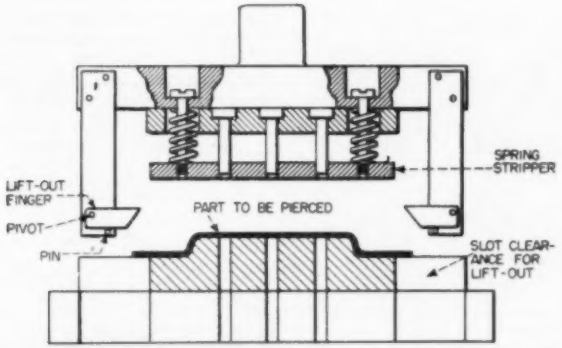
If feeding devices cannot be installed on short-run or temporary tools, equip presses with some type of universal press guard, such as a gate guard, pull-back guard, sweep guard or two-hand control.

There are four chief reasons why accidents occur when an operator must put his hands in the danger zone in second-operation work:

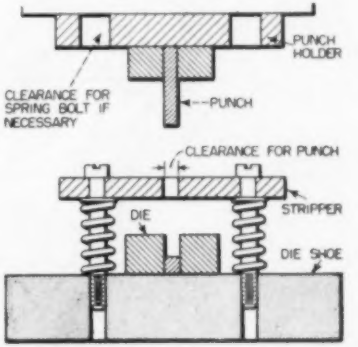
1. The ram may repeat because of inadequate press maintenance.

2. Many point-of-operation accidents have occurred because of unsafe practices like "riding the treadle," reaching around guards, operators alter adjustment of guards, horseplay plus an accidental press stroke during one of these unsafe practices.

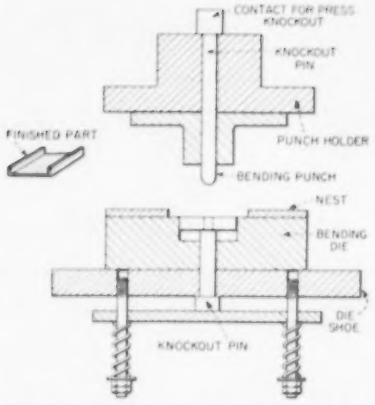
3. Operators disregard safety in-



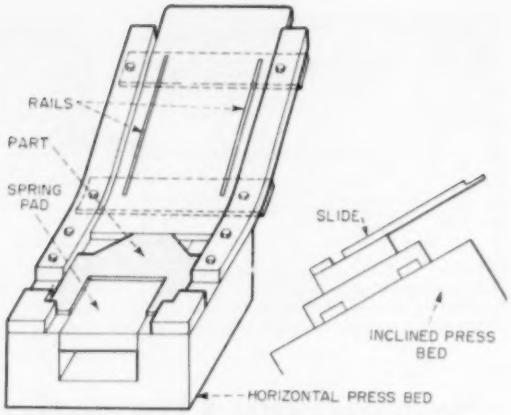
Part ejection should be recognized by the die designer as an important aspect of safety. Here, a spring stripper with lift-out fingers provide for knockout and ejection of finished parts. On the down stroke, the lift-out fingers pivot and ride over the part, falling to a horizontal position under the piece. On the upstroke, pins *A* hold the lift fingers in the horizontal position. Lifted part is ejected to rear of press by air or gravity (press inclined)



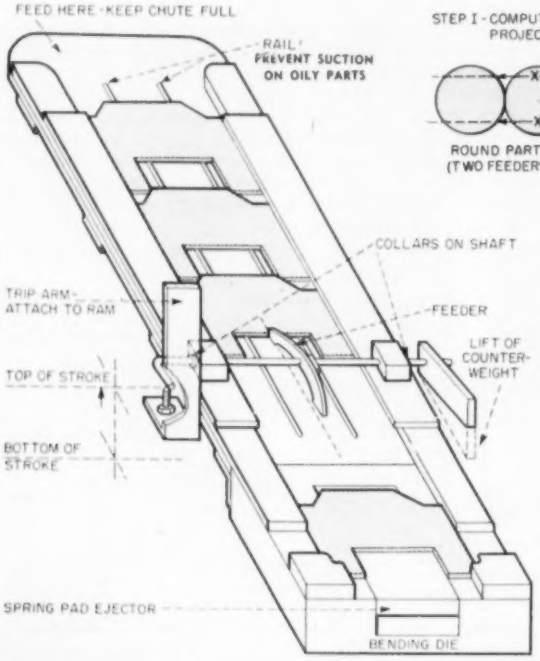
High stripping is accomplished for a short punch by use of a floating stripper. After loading the piece in the die and tripping the press, the punch goes through the clearance in the stripper and forms the part. As the punch goes up, the formed article strikes the stripper and is removed from the punch

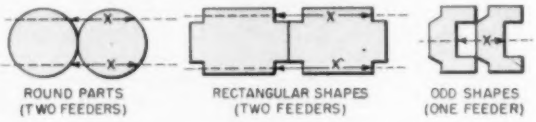


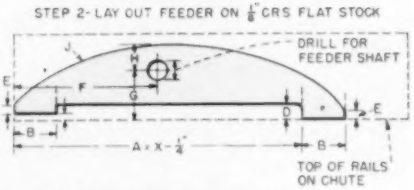
Knockouts should be used on both punch and die, wherever practical in bending and forming operations, in order to achieve safe ejection of finished parts. Their use avoids possible sticking of work to punch or die and temptation to reach under the punch to remove the article



Wire rails on a gravity feed break the capillary action or "suction" of drawing or lubricating compounds on blanks. If the press bed is horizontal, air ejection is supplied, and the end of the inclined chute completes the nest by forming a back stop for the part. Complete protection of the operator is secured by providing a barrier-guard inclosure




STEP 1 - COMPUTE DISTANCE X BETWEEN OPEN AREAS OR RAISED PROJECTIONS ON ADJACENT PARTS ON FEEDER CONTACT LINE
ROUND PARTS (TWO FEEDERS)
RECTANGULAR SHAPES (TWO FEEDERS)
ODD SHAPES (ONE FEEDER)



B = DEVELOP AS APPROX ½ CLEARANCE DISTANCE (ON THE CONTACT LINE) BETWEEN ADJACENT PARTS
C = 1.5 TIMES STOCK THICKNESS
D = C PLUS 1/8"
E = C
F = ½ A
G = ¾"
H = AT LEAST ⅜"
J = SHAPED TO SUIT

Single-unit control of a parts feeder is essential when there is a possibility of the operator getting more than one piece in the die nest per stroke. Further, the feeder so equipped needs no attention except keeping the chute full. The feeder, a pivoting arm that releases one blank and holds back the following blank, is ram actuated. In operation, as the ram nears top center, the trip arm lifts the feeder shaft and the lower leg of the feeder releases a piece, and the upper leg catches and holds back the next piece. As the ram moves downward, the counterweight tips the feeder, so that the piece held by the upper leg is released and comes to rest against the lower leg

structions and attempt to feed a piece to the nest between ram strokes, while riding the treadle.

4. Wool gathering and fatigue, causing a lack of coordination.

Press-room safety is achieved through a combination of the die designer's effort and a good guarding program. The designer must consider both feeding devices and ejection devices, in an effort to keep the operator's hands out of the danger zone.

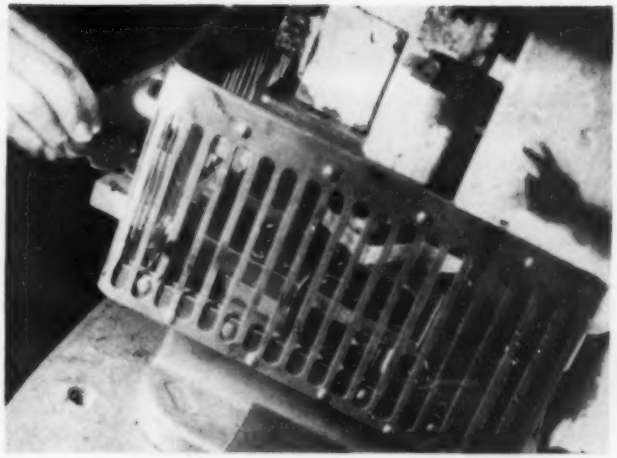
What to Do First

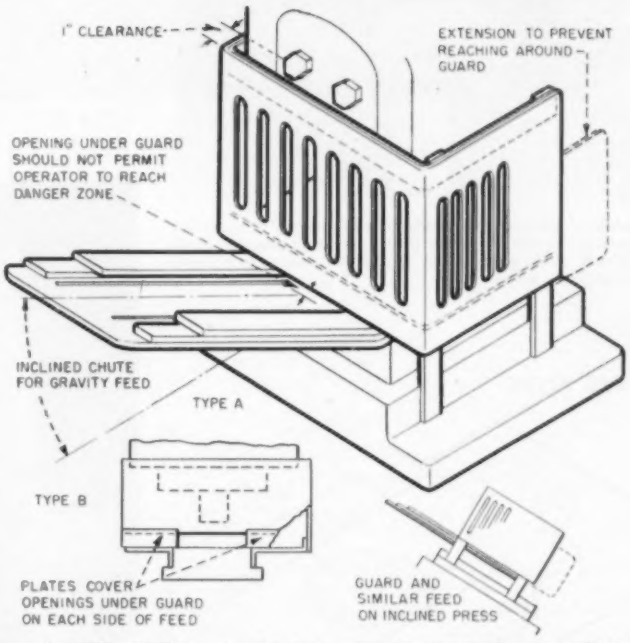
The first consideration is the method of stripping the part so that it can be ejected from the nest. A stripper or a press knock-out should be provided. Now, with the part upon the pressure pad or in the nest, it must be removed to a tote box. Inclination of the press and correct shaping of the nest will allow the finished part to fall out by gravity. Compressed-air ejection is a most efficient way of removing finished parts. And pusher plates actuated by an air cylinder in timed relationship to ram movement are satisfactory.

These devices get the part out of the die and the press without tempting the operator to reach under the punch. But the operation of feeding the blank is just as hazardous. To eliminate this hazard, provide a device that will position the part in the die without manual intervention. Simple feeds can often be attached to existing dies. They pay off in both increased safety and increased output.

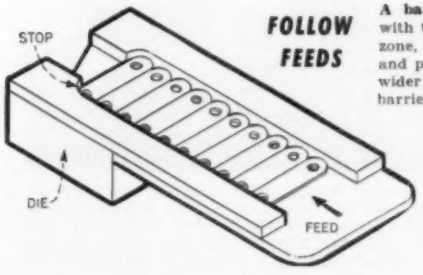
Several types of feeds are rather simple devices:

1. Gravity feeds consist of an extended chute provided on the die. The part slides down the chute by gravity and enters the



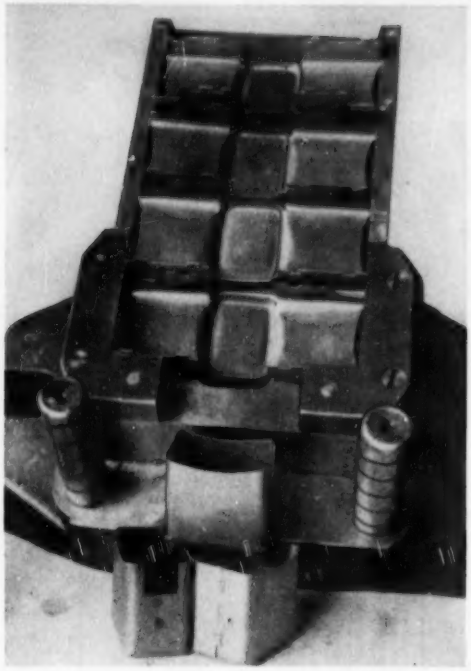

1" CLEARANCE
EXTENSION TO PREVENT REACHING AROUND GUARD
OPENING UNDER GUARD SHOULD NOT PERMIT OPERATOR TO REACH DANGER ZONE
INCLINED CHUTE FOR GRAVITY FEED
TYPE A
TYPE B
PLATES COVER OPENINGS UNDER GUARD ON EACH SIDE OF FEED
GUARD AND SIMILAR FEED ON INCLINED PRESS

A barrier guard or an adjustable press barrier should be combined with the gravity feed so that the operator cannot reach into the danger zone, either under or around the guard. Type *A* installation is for ram and punch holder of the same width; Type *B* for cases when the ram is wider than the punch holder. Photograph above shows a well-designed barrier guard made of prefabricated material

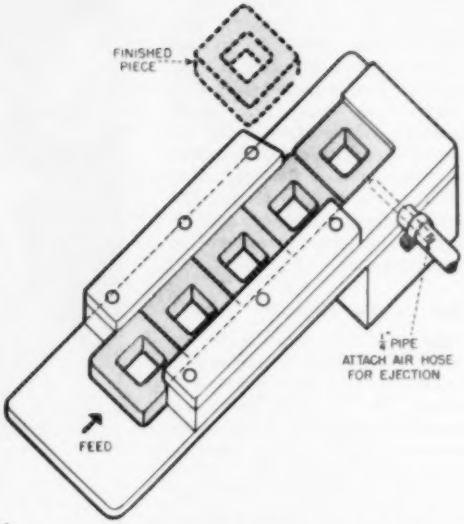


When parts will not slide to a positively nested position, a follow feed may prove practical. Operator places blanks *A* and pushes the pieces ahead to a stop at each stroke of press. The push may be one or more pieces (three pieces are shown) in forming position beyond the punch end. Ejection of formed pieces can be by air, or the nesting plate can be shaped so they will pass through after the operation

FOLLOW FEEDS *continued*

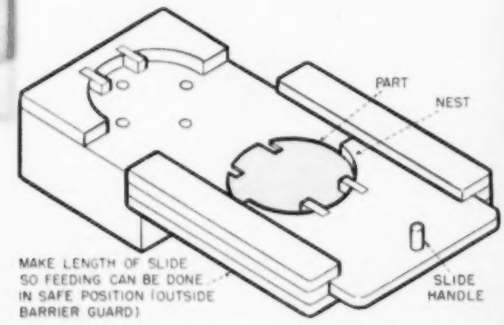


Indexing nests of this follow feed are shaped to hold the partially formed workpiece in the operating position. After finish forming, the part can be pushed through the opening between the nests

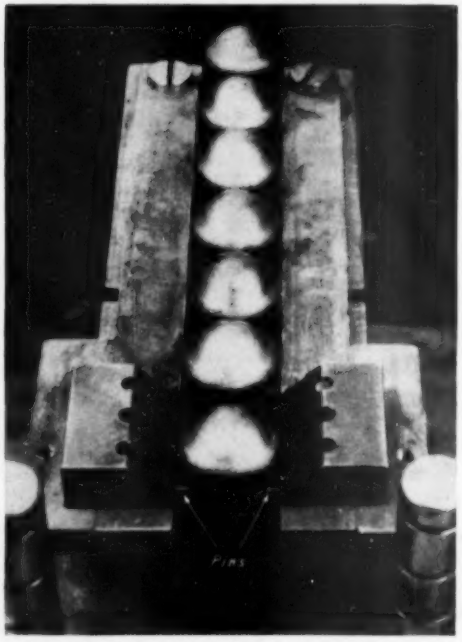


Air blasts or air-operated ejectors actuated by ram travel will provide automatic ejection of finished parts from a partial nest

PUSH FEEDS



Push feeds approximate hand feeding, but keep the operator's hand out of the danger zone, especially if the needed barrier guard is also supplied. The pusher is a plate that operates in a slide. By shaping the pusher, a nest is provided to orient the part with respect to the die opening. Use a stripper or knockout in the die for ejection of the finished part. Length of the slide should be sufficient to allow placement of the blank in the pusher nest at a safe position outside the barrier guard



Sizing and redrawing operations are frequently handled in an efficient and safe manner by use of a follow feed. Note the pins that restrain the shell in the nest until the part is pushed down through the die and out the bottom of the press

die nest. If the press can be inclined, the chute will be parallel to the die face. More rapid and positive control of parts is obtained if press-actuated stops release a piece at each stroke. Thus, parts can be magazined on the chute.

2. Push feeds are employed when an irregular part will not slide down a chute and orient itself properly in the die nest. The part is placed in a nest in a pusher slide and pushed until the two nests register and the piece falls into the die nest. An interlock is usually necessary so that the press cannot be operated until the slide has spotted the part accurately. Magazines are readily applied to push feeds.

3. Follow feeds are specified when the shape of the part is such that it can be used to push another like piece. This feed consists of a flat plate to which side plates have been fastened. The feed plate is kept full, and each piece fed pushes a finished part from the nest.

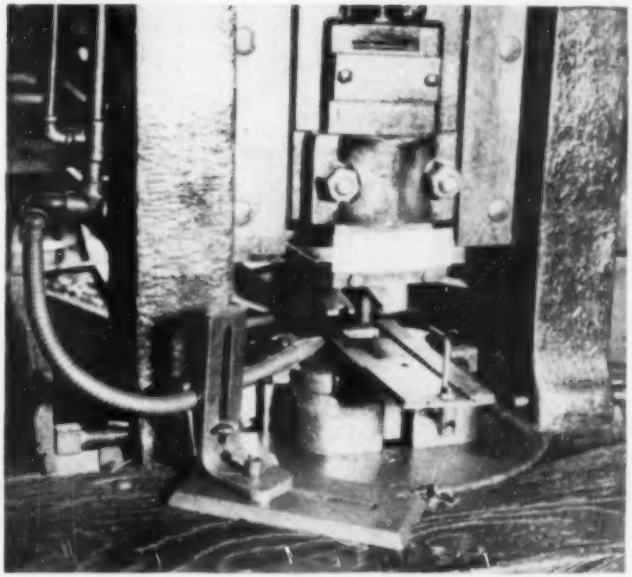
4. Magazine feeds of the manual type (as applied to push feeds) should be designed so that the stack of blanks is tilted. Then, if the blanks are slightly curved or have burrs, the parts do not become interlocked and the slide will operate freely.

5. Automatic magazine feeds applied to push feeds should be interlocked with ram travel. An increasingly popular method of preventing ram motion, unless the part is accurately nested, is provided by precision miniature switches or air valves used in conjunction with solenoids or air-cylinder-latch tripping interlocks.

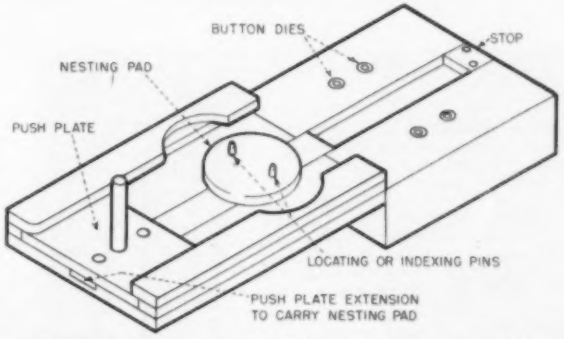
6. When the die is positioned on a pivot or slide, it can be loaded and unloaded outside of the danger zone and pushed to position under the punch, as determined by an interlock. This design is popular for riveting and other small assembly operations.

7. Dial feeds are available commercially for high-production operations. The part is placed in nests in the dial, and the dial indexes one position per ram stroke. Ejection is usually accomplished with pick-up fingers or compressed air.

No program for increasing safety of secondary operations is complete without establishing means to prevent the operator from reaching into the danger zone for any reason. If an effective feeding arrangement has been provided, guarding usually consists of a barrier guard. But if the part must be fed by hand, piece by piece, guarding of the operation requires the installation of a guard operated by the press (sweep, pull-out, etc), or a press control (two-hand mechanical, electrical, pneumatic or various types of gate guards). Positive and effective nesting of the part without need for holding by the operator is imperative. Addition of nesting or supporting plates on many existing dies would eliminate need for the operator to hold the part on the downstroke.

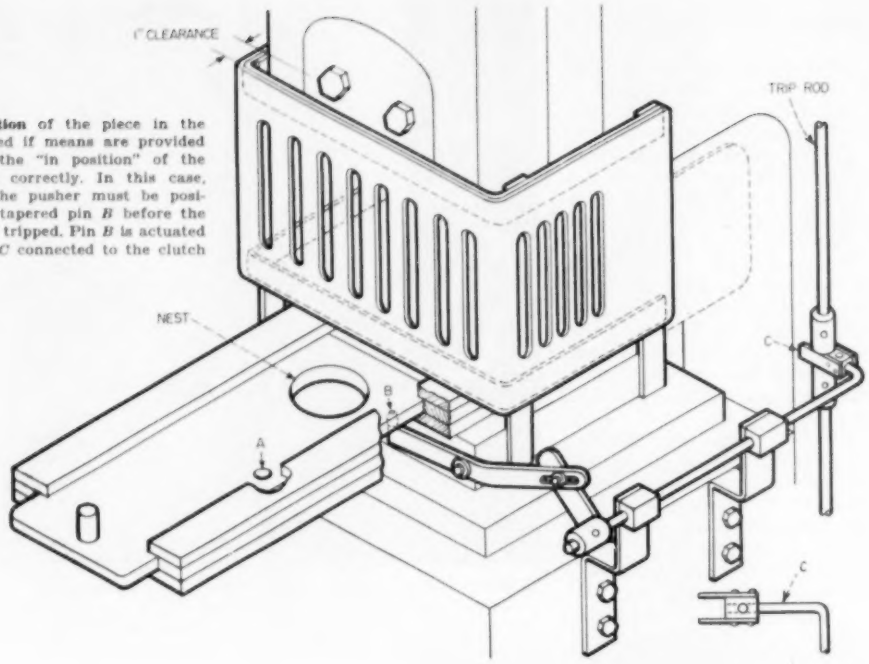


Difficult manual feeding is avoided by a push feed, when the press stroke is short and space is limited. Here, the operator is able to nest small parts in the pusher and deliver them into the "washer die" faster and more safely than by under-punch feeding

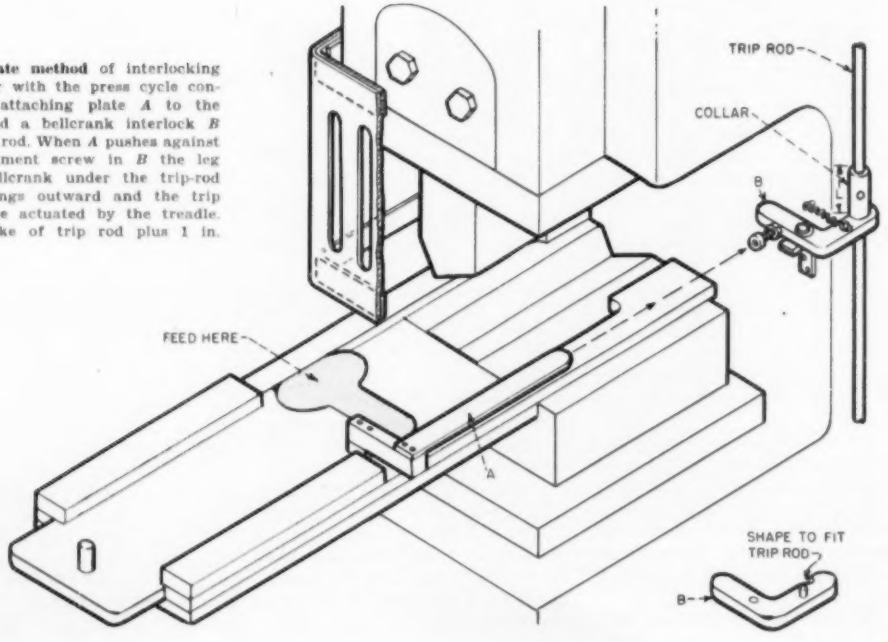


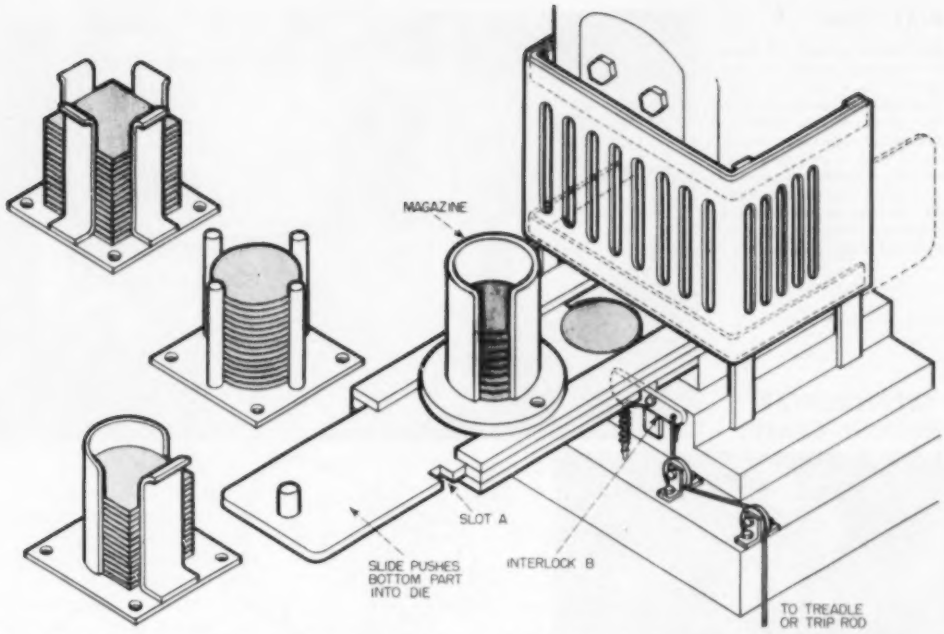
Accurate indexing of the workpiece relative to previous operations can be attained by using a shaped nesting pad or indexing pins in the pad. The pusher can be interlocked with the press treadle to assure proper alignment with the punches

Proper location of the piece in the die is assured if means are provided to register the "in position" of the pusher nest correctly. In this case, hole *A* in the pusher must be positioned over tapered pin *B* before the press can be tripped. Pin *B* is actuated by trip rod *C* connected to the clutch



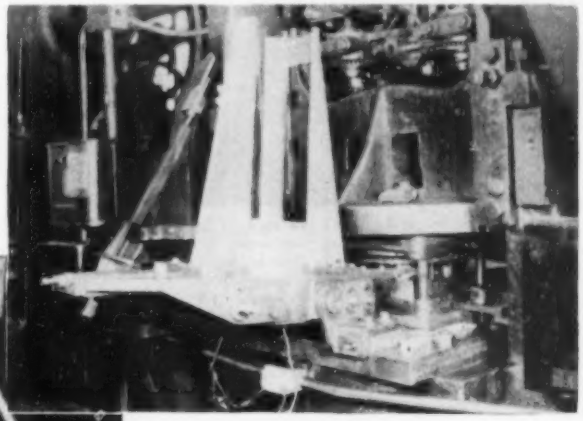
An alternate method of interlocking the pusher with the press cycle consists of: attaching plate *A* to the pusher and a bellcrank interlock *B* to the trip rod. When *A* pushes against the adjustment screw in *B* the leg of the bellcrank under the trip-rod collar swings outward and the trip rod can be actuated by the treadle. *L* = stroke of trip rod plus 1 in.

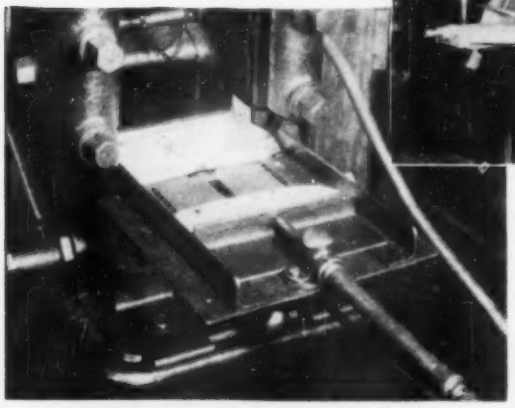




A magazine atop a pusher feed saves effort when feeding parts, and enables the operator to catch every press stroke. Slot *A* in pusher must be in alignment with interlock *B* before press can be tripped. This feature assures proper positioning of the part on the die. Magazines can be of any shape consistent with blank outline

Mechanical actuation of magazine feeds provides greater efficiency than manual operation. Here a rack is attached to the crankshaft and operates the feed slide by a system of gearing like a roll feed

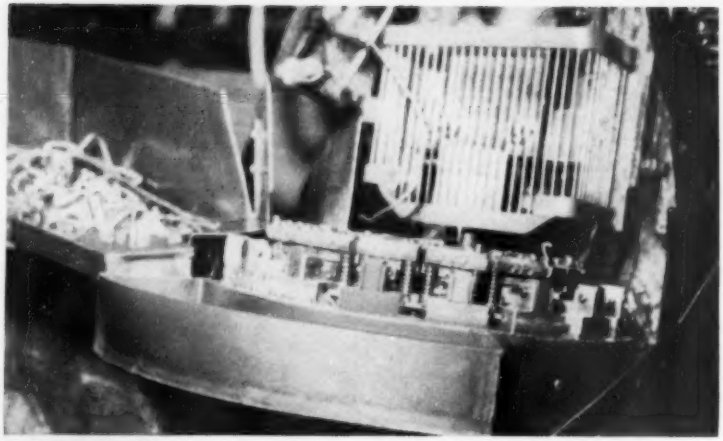




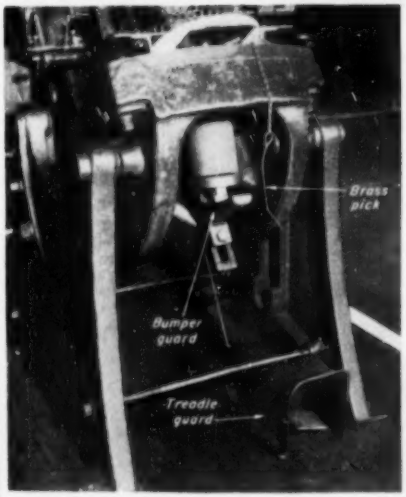
Power actuation of push feeds often increases production and promotes operator goodwill. Here a simple air cylinder timed by ram travel thrusts the pusher inward and a spring returns it. Solenoids may also be used or a mechanical linkage attached to the ram

DIAL FEEDS

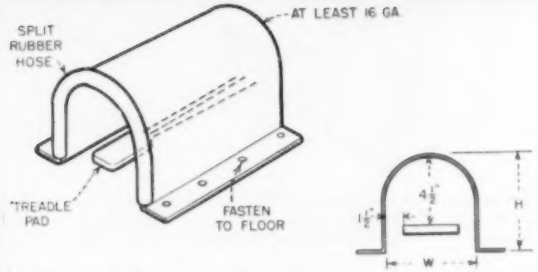
Dial feeds consist of nests or a series of small dies supported on a circular plate that indexes one station with the press stroke. Efficient operation and safety are secured with a dial feed, and its use is justified if production requirements are high. The barrier guard shown is generally sufficient to provide necessary safety



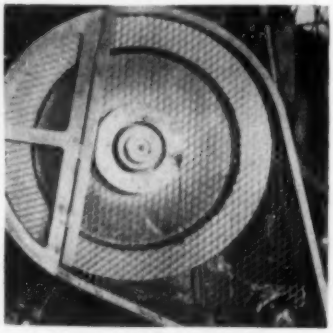
SUPPLEMENTARY MACHINE GUARDS



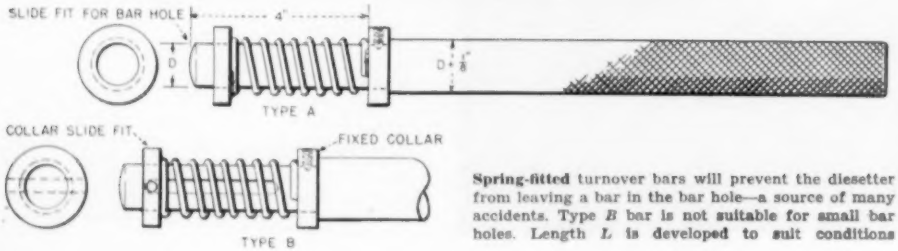
Three worthwhile safety items are seen at the underside of an inclined press. The brass pick enables the operator to relieve die jams or remove scrap without putting his hands in the danger zone. An L-shaped guard with adjustable foot catches the rubber bumper and shaft if the latter should break from fatigue, thereby saving the operator's legs from injury. Finally, the treadle guard avoids tripping of the press by falling objects



Tradle guards should be laid out to cover the entire length of the treadle arm if possible, and to provide access for the operator's foot without pinching



In-running nip points (on belts) less than 6 ft 3 in. from the floor should be guarded. A hinged front section in the guard allows access to the flywheel during setup, and is necessary when bar holes are not provided in the crankshaft. Welded, sheet-metal guards withstand severe abuse



Spring-fitted turnover bars will prevent the diesetter from leaving a bar in the bar hole—a source of many accidents. Type *B* bar is not suitable for small bar holes. Length *L* is developed to suit conditions

Will symbols for press tools simplify communications?

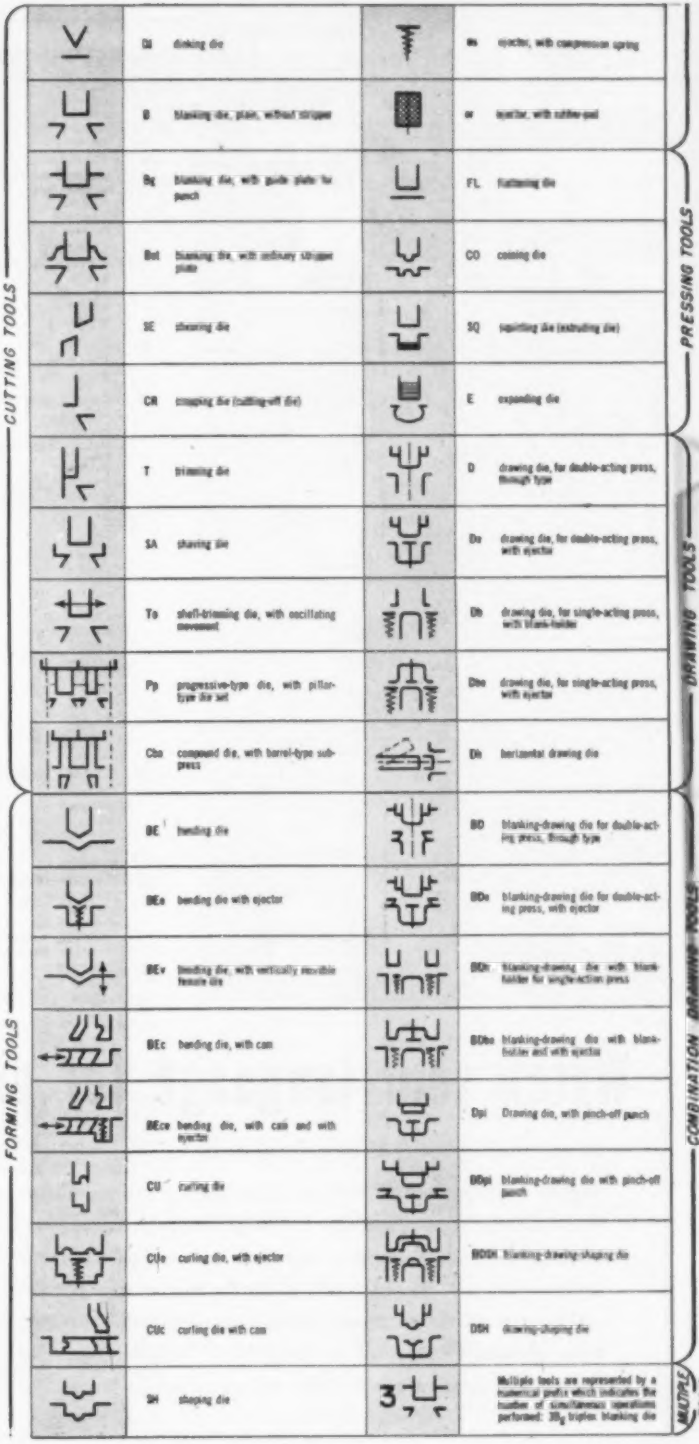
BY FEDERICO STRASSER,
Santiago de Chile

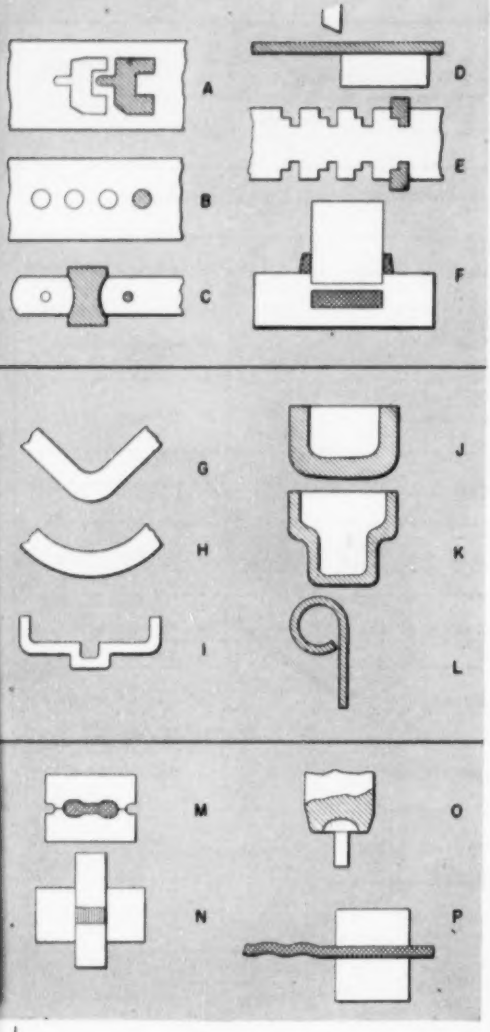
In American practice, the custom does not exist of employing symbols (letters) or schematic sketches (diagrammatic drawings) for the quick representation of press tools and press operations. Among European tool engineers and toolmakers, on the other hand, such symbols and sketches are widely used. Time and misunderstanding are avoided in describing what is wanted. Symbols and sketches are chiefly employed for inter-office and inter-section communications in the same factory. In Germany (where this system seems to have its origin), the practice has almost official character, and therefore the symbols may be utilized in communication between separate enterprises.

Accompanying sketches show European practice by skeletonized representation of the press tool. Symbols, selected by the writer, use the first letter (or when necessary, the first and another letter) of the corresponding English expression. Capital letters denote the press operation and small letters indicate construction details.

B —blanking
BE—bending
C —compound
CO—coining
CR—cropping
CU—curling
D —drawing
DI —dinking
E —expanding
FL —flattening
P —progressive
SA—shaving
SE—shearing
SH—shaping
SQ—squirting
T —trimming

b —blank-holder
ba—barrel type (sub-press)
c —cam
e —ejector
g —guide plate
h —horizontal
o —oscillating
p —pillar type (die-set)
pi —pinch-off
r —rubber-pad
s —compression spring
st —stripper
v —vertically movable


CUTTING TOOLS
FORMING TOOLS
PRESSING TOOLS
DRAWING TOOLS
COMBINATION DRAWING TOOLS
MULTIPLE TOOLS
DI dinking die
B blanking die, plain, without stripper
Bg blanking die, with guide plate for punch
Bst blanking die, with ordinary stripper plate
SE shearing die
CR cropping die (cutting-off die)
T trimming die
SA shaving die
To shell-trimming die, with oscillating movement
Pp progressive-type die, with pillar-type die set
Cba compound die, with barrel-type sub-press
BE bending die
BEe bending die with ejector
BEv bending die, with vertically movable female die
BEc bending die, with cam
BEce bending die, with cam and with ejector
CU curling die
CUe curling die, with ejector
CUc curling die with cam
SH shaping die
E ejector, with compression spring
er ejector, with rubber-pad
FL flattening die
CO coining die
SQ squirting die (extruding die)
E expanding die
D drawing die, for double-acting press, through type
De drawing die, for double-acting press, with ejector
Db drawing die, for single-acting press, with blank-holder
Dbe drawing die, for single-acting press, with ejector
Dh horizontal drawing die
BD blanking-drawing die for double-acting press, through type
BDe blanking-drawing die for double-acting press, with ejector
BDh blanking-drawing die with blank-holder for single-action press
BDbe blanking-drawing die with blank-holder and with ejector
Dpi Drawing die, with pinch-off punch
BDpi blanking-drawing die with pinch-off punch
BDSH blanking-drawing-shaping die
DSH drawing-shaping die
3 Multiple tools are represented by a numerical prefix which indicates the number of simultaneous operations performed: 3B triplex blanking die



I. CUTTING OPERATIONS

A TO BLANK
découper des flans
ausschneiden
recortar
tranciare
recortar

B TO PIERCE
poinçonner des trous
lochen
punzonar
perforare
perfurar

C TO CUT OFF
trançonner
abschneiden
tronzar
troncare
trinchar

D TO SHEAR
cisailler
abscheren
cizallar
tagliare con cesoia
cortar com tesoura

E TO TRIM
grugер
beschneiden
muescar
intaccare, troncare incavi
desbastar

F TO SHAVE
repasser
nachschneiden
repasar
ripassare, rifilare
raspar

II. FORMING OPERATIONS

G TO BEND
plier
biegen
doblar
piegare
dobrar

H TO CURVE
cintrer, courber
runden
encorvar
curvare
curvar

I TO SHAPE
profiler
formstanzen
conformar
profilare
perfilar

J TO DRAW
emboutir
ziehen
embutir
imbutire
estirar

K TO RE-DRAW
réétirer
nach-ziehen
re-embutir
re-imbutire
re-estirar

L TO CURL
reborder
rollen
rebordear
bordare, arricciare
rebordar

III. STAMPING OPERATIONS

M TO DROP-FORGE
estamper avec
pressen
forjar en matrices
stampare in matrici
forjar em matrizes

N TO COIN
frapper
prägen
acuñar
coniare
cunhar

O TO RIVET
riveter
nieten
remachar
ribadire
rebitar

P TO SWAGE
refouler rétreindre
stauchen
recalcar
ribattere
estampar

Watch your language for pressworking

BY FEDERICO STRASSER, SANTIAGO DE CHILE

Readers of *American Machinist* in various parts of the world, also English-speaking shops that receive articles or correspondence in foreign languages, will appreciate the six-language illustrated dictionary for pressworking operations. Like an earlier page "Watch Your Language for Die Components" (*AM*—August 6, 1951, p 105) the English word is followed by the foreign-language equivalent in this order: French, German, Spanish, Italian and Portuguese.

Press operations: Operations de Presse (Fr.); Press-Vorgänge (Ger.); Operaciones en prensas (Span.); Operazioni in presse (Ital.) and Operaçoes em prensas (Port.)

ROUND TABLE

Wearing Off the Green

"What's the big idea of spending so much time with your new men, Al? Looks to me as though you're letting down on your regular job."

"May look that way to you Ed, but I have something else in mind. I took on a new man from Portland. I thought that he was so far away from his old stand that he might feel more at home if I had a good talk with him. And you don't need to think that I had all the answers—that fellow put me wise to a few good schemes that are going to benefit the company."

"But, Al, the amount of time that you spend with new men is costly; while you're digging gold at one source you're letting real dough get away from you in neglecting your other duties—and in supervising the regulars."

"I'm not neglecting other duties, Ed; I don't have to keep my eye on the job every minute—it gets monotonous."

"You really don't mean that, Al. What's the matter, are you getting fed up with the real job of supervision?"

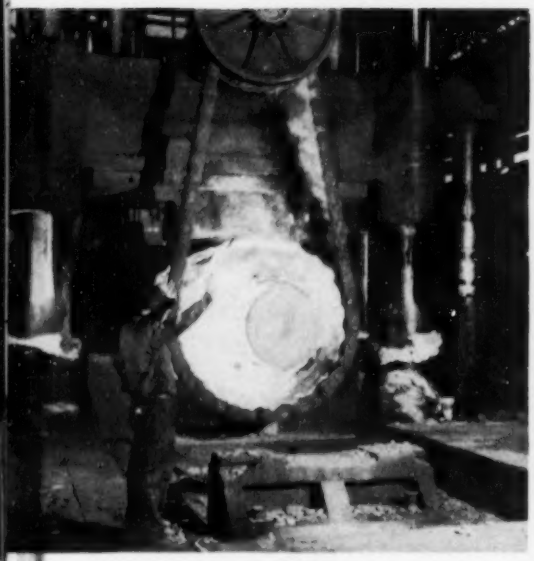
"Not by a long shot; but I'm accomplishing three major purposes: I'm breaking down the barrier between the man and me so that we can see eye to eye; I'm making the man feel at home and thereby gaining his confidence before somebody injects some negative ideas; and lastly, I'm scratching the surface of new ideas that all new men are filled with."

"But I still think you'd do better to handle your regular job and let him catch on gradually. There's no point in digging out new ideas and letting the old ones go to pot."

"What's more important than having a good understanding with a man while he's fresh on the job and needs your personal counsel? And, besides, most of the men we lose are the new ones—the green never wears off before they quit. Maybe by paying 'em a little attention I can ease the strangeness. It costs money to train new men, you know. Why not save time and trouble in the long run by spending a little now?"

"I don't know where you'll find it, Al—and some of the older men may begin to feel you're favoring the new man. What happens then?"

DOES spending time on a new man help develop and save him—or does it spoil him and create dissatisfaction among older employees? Your ideas and opinions on this subject will interest others. Discussions of earlier topics appear on later pages.



FIRST OPERATION is performed on 92-in. ingot. Mold corrugations are still visible. Finished piece will be disk for rotor of compressor in new supersonic wind tunnel at Ames Aeronautical Laboratory. Following cropping and upsetting . . .

SUBSEQUENT FORGING OPERATION finishes greater part of piece to required thickness in a length-wise path. Limited by spread of the press columns, entire piece cannot be forged to required thickness during this operation, leaving lips on each side. In final operation . . .

PAIR FORGING MAKES GIANT ROTOR

FOR JET-FIGHTER AND GUIDED-MISSILE RESEARCH

When completed, disks shown on these pages will become part of a giant axial-flow compressor now under construction at Newport News Shipbuilding and Drydock Co. After forging, heat-treating, and rough machining at Bethlehem, each disk was mounted on a low-bed trailer truck—its size did not permit shipment by railroad freight car—and was hauled under special police guard from Bethlehem to Philadelphia, for trans-shipment to Newport News by boat. After final finishing, they then will be shipped by water, through the Panama Canal to the Ames Laboratory at Moffet Field. There, they will be installed in one of two compressors, each of which will be used independently to operate the tunnel. Driven by the greatest power output ever employed for a single shaft—four electric motors, each weighing more than 145 tons and totalling 180,000 hp—the new tunnel will have a test section 8 ft across. Speeds several times those of sound will be reached in this test section to develop aerodynamic information for the design of tomorrow's fighters and guided missiles.

PAIR FORGING reduces lips to required thickness. By widening the dies it is not necessary for wide section of forging to be under press. Two forgings are finished at a time, preventing unequal loading of the 7500-ton press. Completed disk posed another problem as . . .

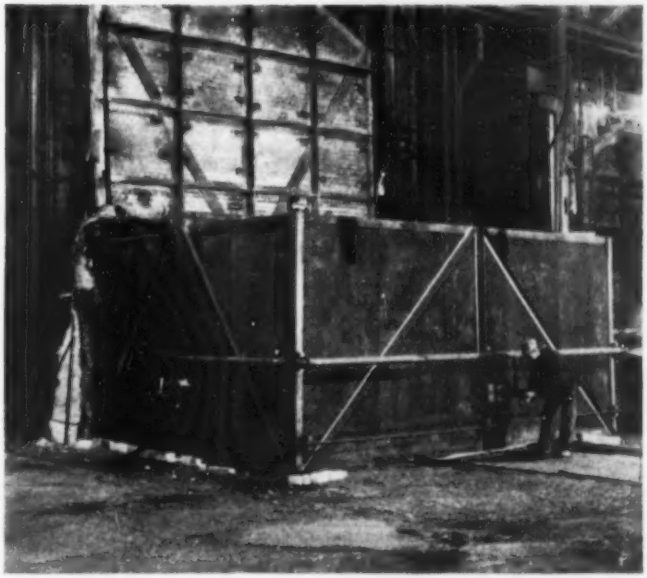
MATERIALS HANDLING was complicated by the fact that the 18-ft diameter forging did not permit conventional transportation from shop to shop. Held at an angle, disk was moved through doorway on railroad well-car especially rigged for the job. During forging sequence . . .

DISKS

HERE'S the triple-threat problem that faced Bethlehem Steel's forging shop in producing giant rotor disks for NACA's new supersonic wind tunnel at Ames Aeronautical Laboratory:

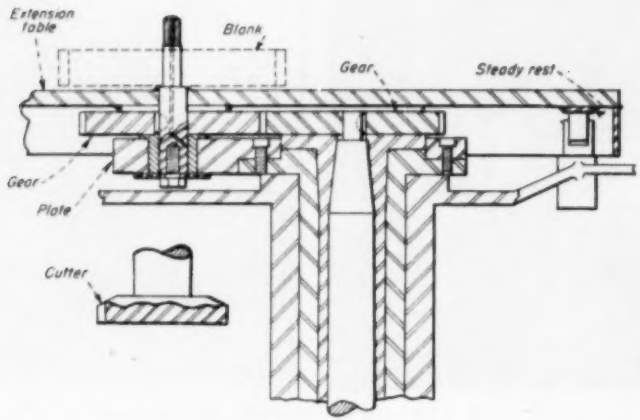
1. Disks were greater in diameter than the spread of the columns of the 7500-ton press on which they were produced.
2. Their dimensions as they were worked down exceeded the width of the heating furnace.
3. They also were larger than the width of the doors in the forging and machine shops.

Wider and heavier than the pole pieces Bethlehem forged for the Columbia University Cyclotron (*AM*, Nov. 17, '49—p 98), the disks are 18 ft in diameter, 9 in. thick, and weigh nearly 50 tons.



CAR-BOTTOM FURNACE to which pieces were returned for reheating between forging operations eventually was not large enough to encompass the huge disks. Solution was a hood erected around the furnace door, permitting the lip to be reheated

Practical Ideas



Simple Mechanism Increases Gear-Shaper Capacity

As part of a larger contract, we agreed to produce a number of gears of a size beyond the capacity of our biggest Fellows gear-shaper. At first it appeared that a special purpose attachment would be too costly but, after a number of ideas were discarded, we built a device that proved extremely capable.

The unit consists of a table supported on the machine's steady-rest containing a gear attached to the blank-carrying shaft, as shown, and another gear having the same number of teeth fixed to the table. The offset gear shaft-bearing is pressed and welded into a stationary plate. Rotational centerline of the table is moved from the machine's original shaft to the offset gear. The increased dimension between the gears provides the additional distance necessary for the machine to handle the larger gears.

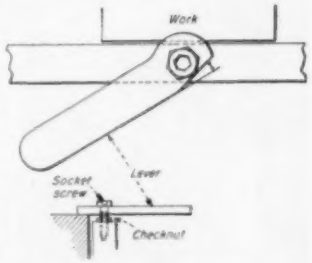
Parts used are machined to close dimensions to minimize chatter but, as the gears are slow-running, they are not hardened. Gears are adequately oiled through the center shaft. To prevent the chip-carrying cutting oil reaching the gears the entire unit is carefully shielded. Gear-blanks and cutters are set in the conventional manner.

First, a roughing cut was made around the blank, leaving about 0.005 in. for finishing. Then the gears were finished well within the permitted tolerance. This fixture will cut both inside and outside gears. *O F Lambert, Columbus, O.*

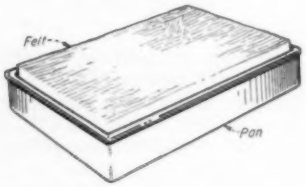
Lever Clamp Eliminates Half-Turn Screw

Although the half-turn screw is widely used as a standard tooling element for holding work during machining, it has several drawbacks. It will seldom score steel, but it will mar aluminum and other soft materials. Fitting by filing or grinding is necessary every time a new batch of work shows dimensional variation. Also, workmen dislike the cuts and blisters that come from constant tightening and loosening; frequently use an oversize wrench and snap off the screw.

The cam-latch shown will more efficiently perform the same function. A socket-head cap screw is screwed through the lever, through a check nut, and into the block. At the proper position for clamping, the screw is locked with the check nut. The lever is semi-circular at the pressure area and cut away at angle shown—to clear the work for loading or removal. Exact machining is not required, except that the holes should be tapped with reasonable care. *R Mery, Farmingdale, NY.*



Oil Pan Controls Fluid Quantity

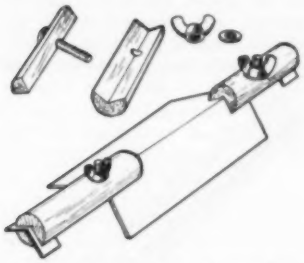


AN OIL-SOAKED PIECE of felt, perhaps two or three layers, in a pan of drawing oil, is a good answer to the problem of excessive drawing oil in a press shop. This setup allows dragging the parts across the felt, which will deposit only a controlled amount of oil, and which reduces dripping.

The felt should be big enough to nearly fill the pan, and oil should be replaced frequently to keep the top layer of felt wet. Several such pans work well when the product is large in area. *Fred Lettino, Astoria, L. I., N. Y.*

Wooden Soldering Clamps Set Up Corners

TWO THIN SHEETS of metal to be joined to form a right-angle corner are held by two of these little clamps. They can grip and position a fairly wide range of stock thicknesses.



We made these from broom handles, cutting a sector out of each length with a circular saw. It was important to get the two cuts exactly at right angles.

The same idea can be used for tack-welding sheet stock, and for setting up odd angles, because the work involved in making the clamps is slight.

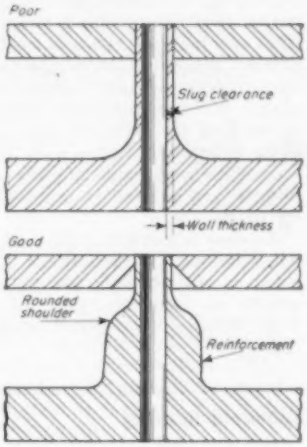
A bolt through a hole drilled in each assembly does the clamping, and a bent shim at the rear of each clamp compensates for the thickness of the stock being held, and keeps the clamp aligned reasonably well. *C T Bower, London.*

Reinforced Punch Walls

PUNCHES with thin walls cause plenty of trouble in the heat-treat room, where they are likely to warp out of line. In addition, thin punch walls are bad from the standpoint that any misalignment in the die may exert enough side pressure to snap them.

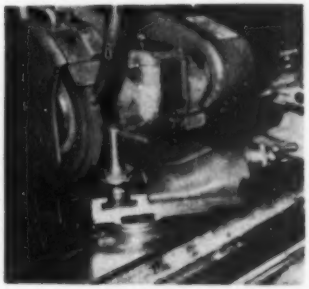
Reinforced punches are the answer. Although the wall of the punch must be thin where the punch enters the die, the part of the punch that clears the die can be built up to good advantage. As illustrated, a rounded shoulder can be provided, or you can make the punch with a sharp taper, flaring from the end to the base.

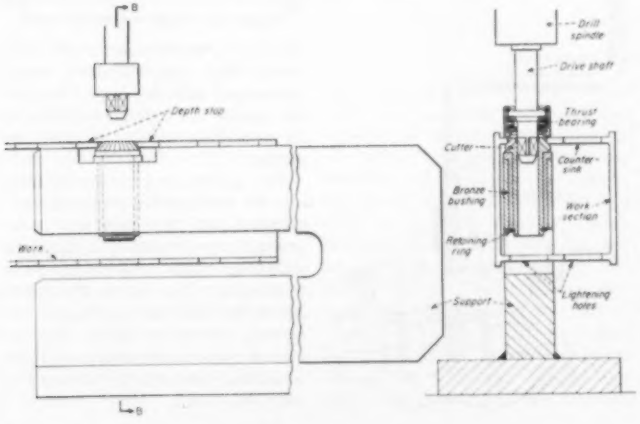
Hours can be cut from production time this way. *F C Elmo, Dayton, O.*



Simple Angle-Dresser

By using parts salvaged from obsolete machines, an attachment can be made, to fit on a surface grinder, which will dress any wheel to the desired angle. As shown, the only part especially made for the attachment is the toolpost. The lower parts are, simply, a lathe crossfeed compound and a base from a milling machine vise. Parts are simply bolted together and held on the machine with T-bolts. *Geo F Burnley, Oakland, California.*





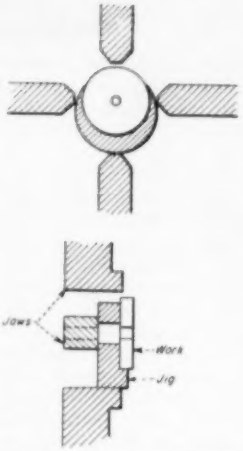
Inverted Countersink

On some light alloy extrusions, of box section, we had to lightly countersink the inside of the lightening holes. To do this we built the fixture shown, which was clamped on a drillpress table. The driveshaft was mounted on the drillpress spindle. By forcing the spindle downward, the driveshaft engages the cutter in its square section and also presses the work against the cutter. The fixture surface acts as a depth stop. *A Vetsch, Switzerland.*

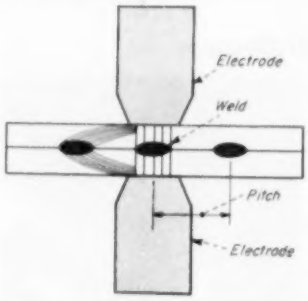
Four Jaws Work Fast as Three

FOR SPEED in chucking, facing, chamfering, and sometimes shouldering small pieces, this arrangement of a four-jaw chuck is ideal. A round fixture is made to take the part (usually a second-operation piece), but is clamped off center by three of the jaws. The fixture block is bored to a light press fit around the work, and the piece is inserted and gripped in place by the fourth jaw.

A means of extracting the work, when finished, can be provided by using a rod through the lathe spindle to poke the piece out. *R W Morrison, Cheltenham, England.*



Spotweld Spacing

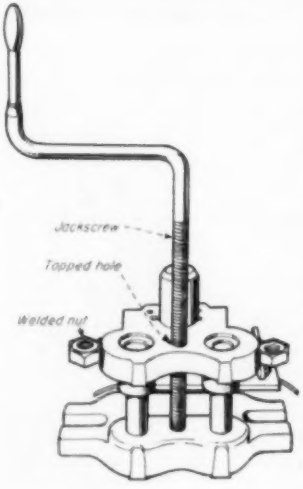


It is important when spotwelding to insure that welds are not too closely spaced or too near the edge of the material. If the welds are too close to a gap, the shunt current increases to a large proportion of the total and insufficient heating is developed at the weld zone. Weld spacing should be no less than 3½ times the weld diameter and welds should be no closer to the edge of the material than 1½ times the weld diameter. *R G Vare, Christchurch, England.*

Jackscrew Die-Lifter

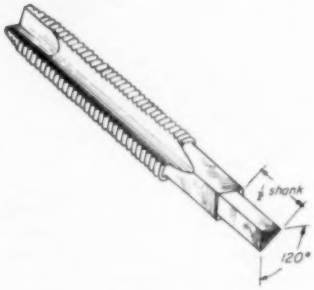
To separate punch holders from die shoes more simply and with less chance of damage to the tools than is possible with a pinch-bar, we use a jackscrew. Also, this device makes it possible to fit punches with less effort as the punch holder can be raised, lowered, or held as necessary.

Dies up to 20 in. can be handled with one ⅝-in.-dia screw centered between the guide pins as shown. On long, or wide, and narrow dies use two screws by welding, a hexagonal nut at each end of the punch holder, or place drill and tap holes spaced equally between the guide pins. *M M McKenzie, Lodi, California.*



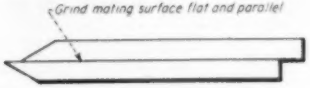
Drill Chuck Drives Taps

To avoid making an adapter for each size of tap used in a tapping head, grind the square shank triangular. This form permits the tap to be held in a conventional drill chuck, which is satisfactory for most purposes. By grinding the triangular shape on only one-half of the shank, the square portion permits easy removal if the tap should break at the slightly weakened reduction. However, the



slight loss of shank strength is not a problem, while the increased versatility is a considerable advantage. It is helpful to make tap wrenches for the three-cornered shanks. *Oscar F Lambert, Columbus, Ohio.*

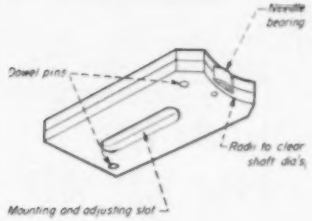
Toolbits Scribe For Height-Gage



Two ¼-in. toolbits are much more useful than the standard scribe that comes with the gage. The toolbits enable the toolmaker to transfer a reading without moving the vernier.

This is done by grinding the toolbits flat and parallel on the surface grinder and then placing them, ground sides together, in the gage with one scribe protruding. Take a reading, then move the other scribe out and the reading is reversed. Thus, the scale can be moved up or down with practically zero loss. *Kenneth J Carson, Los Angeles, Calif.*

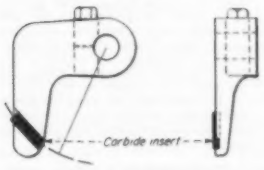
Antifriction Steadyrest Jaws



As we go to higher speeds and heavier cuts in lathe operation, the friction, distortion, and scoring that are familiar to users of conventional steadyrests become an even greater problem.

By adding an antifriction bearing to the steadyrest jaws the difficulty can be eliminated. Needle bearings seem to be most suitable as they provide more contact and minimize chatter. With the assembly shown, small and large finished shafts have been run at high speed without scoring. *Dale Orr, Knoxville, Tenn.*

Carbide Insert Stops Swing-Stop Wear



Wear and rapid pitting of the swing-stop are common trouble when stainless steel rods are machined in an automatic screw-machine. This is especially true when the rods are pointed or rounded on the front end. Thus, the work is either marred, bent, or thrown out of tolerance.

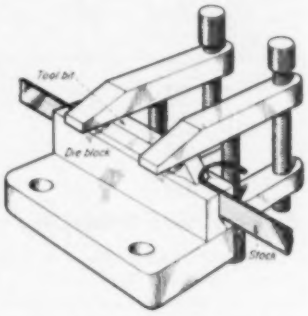
By grinding a slot 3/32 x 1/4 in. along the wear line and brazing a piece of wear-resistant tungsten carbide into the slot so that it projects from the surface about 0.015 in., stop life will be greatly increased. The tungsten insert should be ground parallel to the finished surface. *Otto V Howe, Waterbury, Conn.*

Shaving Cutter Slices Brass to Width

A TOOLBIT MADE OF HSS, ground to shape, and clamped over a slit die block cuts oversize edges off strip brass material easily. This tool has been operated with brass, but should work well on other soft metals, too.

The die block is slotted almost to the depth of stock desired, and the tool is clamped right over the slot, against the top of the die. Shims are inserted under the bit, over the die block, to raise the cutting edge to just the right height. These must, of course, clear the stock. Two shims of equal thickness are used, one on each side of the slot in the die block.

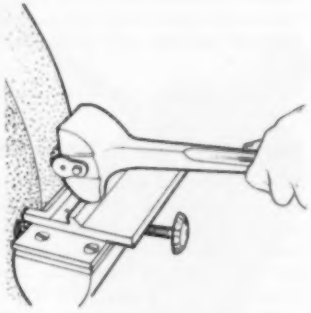
Stock is ground to a taper when a new strip is started through the die, is pushed through, then



grasped with pliers. Manual pull is enough to take off a width of as much as 1/16 in. of stock, although we take 1/32 in. to hold tolerances as close as 0.0002 in. *R J Dodson, Chicago, Ill.*

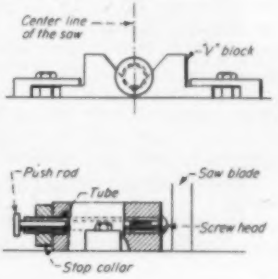
Guide for Dressing

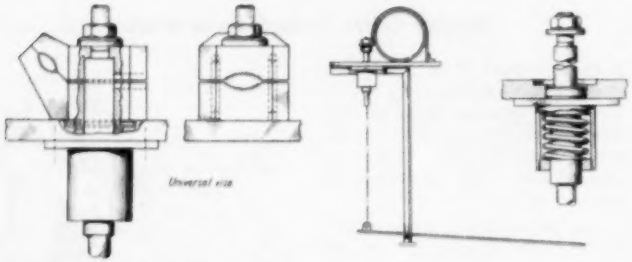
To overcome the usual oscillating effect which occurs when dressing the wheel of a pedestal grinder by hand, make a jig from discarded parts and do the job more easily and safer. This jig consists of a steel plate slightly wider and broader than the toolrest of the grinder. A pair of guide rails are fastened over the surface of the jig, parallel to the grinding wheel axis. The entire assembly is held in place by thumbscrews. *Geo F Burnley, Oakland, California.*



Bandsaw Slotting Fixture

When a rush order came in which called for hundreds of slotted-head screws and our miller was tied up, we turned to the metal-cutting bandsaw. The fixture we made consisted of a "V"-block and a steel tube. With the "V"-block clamped to the saw table so that its centerline coincided with the blade, the steel tube was reamed to fit the major dia of the screw. The tube was externally threaded for a stop-plate and a push-rod was made to bottom against the stop-plate. This push-rod thus determined the depth of feed and also removed the slotted screw. *T H Hsu, Taiwan, China.*





Body-controlled Welding Fixture

WELDERS who find that, with both hands occupied, they must still move or position the workpiece may be able to simplify the job with this "third hand." Actually, the device provides for foot or body control.

As shown, a strip of sheet-metal is formed into a loop with one side fastened to the table and the other side connected to the spring-loaded table attachment. Body weight is applied to the pedal, thus bringing, without deformation, the edges of the rolled sheet to desired spacing for tack-welding and welding.

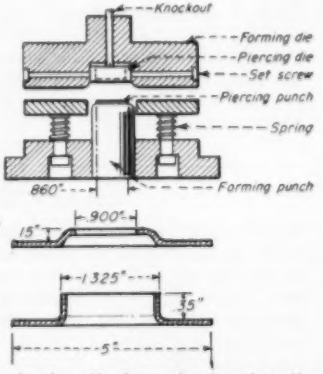
Instead of the solid sheetmetal strip, a strip of stainless steel or similar non-scaling material with equally spaced elongated holes would serve the double purpose of holding and spacing. Two similar tubes can be set up, tacked, and welded longitudinally, annularly, or at any angle in the universal vise shown. Variable clamping force allows for shrinkage and expansion. Two universal vises and two table attachments can be installed and connected to operate from one pedal. *D G Nolle, Montreal, Canada.*

Pierce and Draw in Simple Die

Some compound operations permit the use of simple dies. One such job is the flange shown which called for a 1.325-in. dia × 0.350-in. high draw in the center of a 5-in. dia, 0.050-in. gage CRS blank.

At the beginning of the stroke, the blank is tightly held by the draw-ring. First, the blank is contacted by the piercing punch and a small indentation is formed by the forming punch. Then an 0.860-in. dia hole is pierced in the dent. At the end of the stroke the indentation depth is increased to 0.150 in. and the 0.860-in. dia hole was expanded to 0.900-in. dia without breaking the edges of the hole. These dimensions were determined by "cut and try" to provide enough material for the next operation—forming the shell to the required depth.

After deburring the parts, if burns are present, remove the



piercing die from the forming die by loosening the setscrews, replace the draw-ring, and adjust the forming die to the lowest dead-center position of the press. Thus, the parts can be drawn to the required depth. *T H Hsu, Taiwan, China*

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JUST ONE MINUTE

1

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Safe Handling of Magnesium...I

Abstracted from "Standards for the Storage, Handling and Processing of Magnesium", as adopted by the National Fire Protection Association

PROPERTIES AND CHARACTERISTICS

The melting point of magnesium is 1204 F (651 C) and the ignition temperature is generally considered to be very close to the melting point, but ignitions of magnesium in certain forms may occur at air temperatures below the temperature given. Magnesium ribbon and fine magnesium shavings can be ignited under certain conditions at air temperatures of about 950 F, and very finely divided magnesium powder has been ignited at air temperatures below 900 F.

HEAT TREATING

Fire may occur in furnaces or ovens when magnesium is being heat treated if there is a lack of proper temperature control or if the surface of the work is not free from dust or fine particles of metal. Failure to provide for proper circulation of the heated air in the furnace may result in overheating or higher temperatures in certain zones than that indicated by the thermocouples that operate temperature-control devices.

A standard procedure for checking the uniformity of temperature at various points in a heat-treating oven should be established.

All ovens should have two sets of temperature controls operating independently. One set should be adjusted to operate at a temperature slightly above the other so in case the first control fails the other may be expected to operate before ignition of the magnesium. It is advisable to provide heat-treating ovens with sulfur-dioxide atmosphere, which serves to retard ignition.

Magnesium parts to be put in a heat-treating oven should be carefully freed of magnesium turnings, chips and sawdust.

Magnesium fires in heat-treating ovens can best be controlled with powders or gases approved for use on such fires. If powder is used, burning metal should be removed where feasible from the oven before application of the powder. Where gas is to be used, permanent connections to the oven or entry ports should be provided.

NOTE: Preliminary tests and some limited experience indicate that boron trichloride gas is a suitable extinguishing agent for magnesium fires in heat-treating ovens.

Water may be used to fight fire in combustible materials nearby but should not be used in fighting fire in ovens. Where automatic-sprinkler protection is provided, a deflecting shield or hood must be placed over the oven to prevent sprinkler water from getting into the oven.

STORAGE OF MAGNESIUM

Buildings used for storage of magnesium should preferably be noncombustible, with particular attention given to construction and maintenance of floors.

Magnesium should not be stored in a basement or similar subgrade space because of the difficulty of venting and relieving explosion pressure produced by contact of molten metal with water. Storage over such spaces is likewise not advisable.

Stocks of magnesium should be stored separately from combustible materials.

The size of storage piles of heavy magnesium castings (25 lb, or more) should be limited to 1,250 cu ft, and piles of light castings and of sheets to 1,000 cu ft. Proper aisles should be maintained to permit inspection and effective use of fire-protection equipment. Aisle widths should be not less than one-half the height of piles; aisle widths equal to the height of piles are recommended.

Packing materials should be removed from castings prior to stock storage whenever practicable. Inspect magnesium castings prior to storage to see that they are free from chips or fine particles.

MACHINING OF MAGNESIUM

Friction between the tool and the metal should be kept to a minimum by taking as heavy cuts as consistent with good workmanship, and never allowing the tool to ride on the metal without cutting. Special caution is needed when necessary to make thin cuts or produce fine chips.

Tools should be kept very sharp and ground so there will be sufficient clearance to prevent rubbing on the sides and bottom of the tool. The tool should be backed off as soon as the cut is finished.

Liquid coolants should be restricted to high-flash-point, neutral mineral oils. Water, water-soluble oils and oils containing more than 0.2% fatty acids may generate flammable hydrogen gas. Scrap wet with animal or vegetable oils may ignite spontaneously. Where compressed air is used as a coolant, special precautions should be taken to keep the air dry.

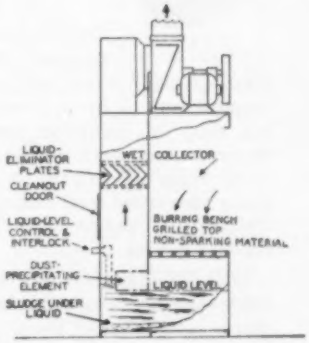
Machines should be provided with a pan to catch the chips or turnings. The pan should be such that it can be readily withdrawn from under the machine in case of fire. In case of fire in the chips, the pan should be withdrawn from under the machine but not picked up or carried away before the fire is extinguished.

GRINDING, BUFFING AND WIRE BRUSHING

DUST COLLECTION: Dust shall be collected by means of suitable hoods or inclosures at each operation, such inclosures to be connected to a liquid-precipitation separator and the suction unit in such a way that the dust shall be converted to sludge without contact, in a dry state, with any high-speed moving parts.

Connecting ducts or suction tubes shall be completely grounded and as short as possible, with no unnecessary bends. Ducts shall have a smooth interior.

Each machine shall be equipped with its individual dust separating unit, ex-



SCHEMATIC ARRANGEMENT of liquid-washed dust collector serving a fixed grinder. Volume of all dust-laden air spaces should be small

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Safe Handling of Magnesium...II

cept that with multi-unit machines not more than two dust-producing units may be served by one separator.

Power supply to machines shall be interlocked with (1) exhaust air flow and (2) liquid pressure level or flow in such a way that improper functioning of the dust removal and separator system will shut down the machine it serves.

CLEANING: Systematic cleaning of entire area involved, including roof members, pipes, conduits, etc., should be conducted daily or as often as conditions warrant (1) by use of soft brushes and nonsparking scoops and containers, or (2) by means of a fixed suction pipe and outlet vacuum-cleaning system, provided the separator unit is of the liquid-precipitation type and provided also that the suction piping system is of standard mild-steel pipe and standard recessed drainage fittings, with a check valve installed at each outlet.

DUST DISPOSAL: Sludge from dust separators and vacuum cleaning unit precipitators should be removed at least daily or as often as conditions warrant. Covered containers, preferably of not over 50-lb capacity each, should be used to transport the collected sludge to a safe point for disposal by mixing with sand and burying or burning.

ELECTRICAL EQUIPMENT, Electric motors, lighting fixtures, control equipment and wiring in immediate vicinity of and attached to dust-producing machines, including that used in connection with separator equipment, shall be of a type approved for use in Hazardous Locations, Class II, Group E, and installed in accordance with the provisions of Article 500 of the National Electrical Code. All electrical equipment shall be inspected and cleaned periodically.

GROUNDING OF EQUIPMENT: All equipment shall be securely grounded by permanent ground wires.

SAFETY PRECAUTIONS: Special clothing for machine operators is recommended. Employees' clothing should be easily removable, kept clean and free from dust. Leather or other smooth clothing, from which the dust can be brushed off readily may be worn. Smooth canvas or denim suits can be made fire-retardant by treatment with chemicals. Clothing should be made with nonferrous snap fasteners and without pockets or cuffs. Wearing of woolen, silk or fuzzy outer clothing or shoes with exposed steel parts should be prohibited.

Machinery and equipment shall not be used for processing ferrous metals.

No open flames nor electric or gas cutting or welding equipment shall be permitted in the section of the building where magnesium dust is produced or handled, while the equipment is in operation.

Special precautions are necessary to prevent ignitions while dressing emery wheels used for grinding magnesium or magnesium-alloy castings. If it is not feasible to remove wheels to a safer location for dressing, hoods should be thoroughly cleaned or removed entirely before wheel-dressing operations are started and all deposits on and around the wheel should be removed.

Only non-sparking tools shall be used in making repairs or adjustments around grinding wheels, hoods, or collector units.

Dust-collection equipment shall not have filters or other obstructions that will allow accumulation of dust.

Sludge pits shall be arranged to be well ventilated.

In the grinding of chrome-pickled magnesium surfaces, special precautions should be taken to guard against accumulations of dust or formation of explosive concentrations of dust and air within range of the sparks which are produced.

DRAWING AND SPINNING

The heating of magnesium for drawing or spinning should provide for reliable means to prevent overheating.

Trimmings should be collected at frequent intervals and placed in clean, dry, metal containers. Fine particles should be handled in accordance with following instructions.

WELDING

Welding of magnesium should be done only by operators who are familiar with this type of welding, using only proper welding procedures.

HANDLING OF FINE MAGNESIUM SCRAP

Chips, turnings and other fine magnesium scrap should be collected from the pans under machines and from any other places where they collect at such frequent intervals as may be needed to prevent the accumulation of any large amount, and always at the end of each day's work.

Fine magnesium scrap should be placed in covered, plainly labeled, clean, dry, metal containers and removed to a detached scrap storage building or to a special scrap storage room of fire-resistive construction. Such rooms or buildings should have explosion vents equivalent to one square foot to each 15 cu ft of room volume.

Fine magnesium scrap which is not being salvaged should be disposed of by burning in thin layers at a safe location.

Fine magnesium scrap which is to be recovered should be kept free of all foreign matter except neutral mineral oils.

If fine magnesium scrap has been wet with coolants other than neutral mineral oils it should be handled and stored with special care.

FIRE PROTECTION

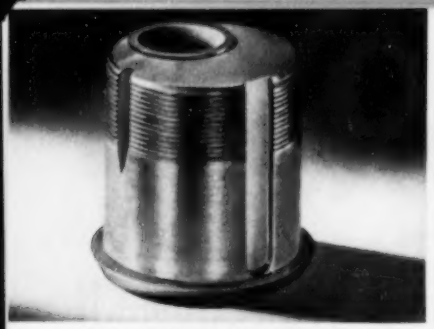
A supply of approved extinguishing powder for magnesium fires should be kept within easy reach of every operator. The powder should be kept in covered metal pails with easily removable covers and a hand scoop provided at each pail for applying the powder. Where conditions may permit the development of a fire requiring a large quantity of powder, it should be provided in drums, and long-handled shovels provided for its use. Heat-resistant gloves and face guards should be available for protection of the personnel applying the powder.

Containers of extinguishing powder should be plainly labeled.

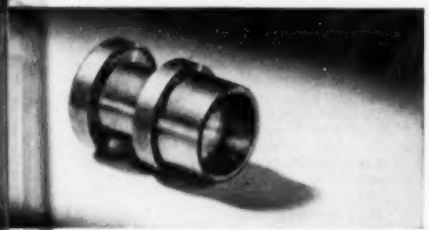
The recommended method of applying powder is to spread it evenly over the surface of the fire to a depth of ½-in. or more without scattering the burning metal. If smoking continues in spots, more powder may be added and stirred in gently to bring the powder into contact with the fire. Where the burning metal is on a combustible surface, the fire should be first covered with powder, then a 2-in. layer of powder spread out nearby and the burning metal shoveled onto this layer, with more powder added as needed.

When the building in which magnesium castings are stored or processed is of combustible construction, or cartons, crates or other combustible packing materials around the castings constitute a fire hazard, automatic-sprinkler protection is recommended.

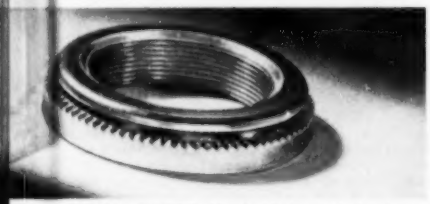
Special importance attaches to prompt fire detection and alarm service, prompt sprinkler operation, and the avoidance of obstructions to sprinkler distribution which would permit combustible materials to continue to burn under sprinkler discharge and result in ignition of magnesium.



LOCK CYLINDER. Metal: 1¾" dia. brass • Machine: model 601 New Britain Gridley • Operations: *cross slide*—rough form, finish form, break down cut off, side mill, vertical end mill, final cut off; *tool slide*—face, drill offset hole, ream and counterbore offset hole, thread • Spindle Speed: 1,324 rpm • Feed: .006" per revolution • Tools: high-speed steel • Cycle Time: 7.3 seconds



CARPENTER'S PLANE PART. Metal: ⅝" B1113 steel • Machine: Brown & Sharpe Automatic Screw Machine • Operations: *front cross slide*—form; *rear cross slide*—cut off; *turret*—feed stock, spot drill, drill 13/32" hole, tap drill, reverse spindle and tap left-hand thread • Spindle Speed: 1,130 rpm • Feed: .0025" per revolution • Tools: high-speed steel • Cycle Time: 30 seconds



KNOB INSERT. Metal: 1⅞" round aluminum • Machine: model 61 1¼" New Britain Gridley • Operations: *cross slide*—form, knurl, cut off; *tool slide*—spot drill, tap, ream, recess • Spindle Speed: 1,600 rpm • Feed: .005" per revolution • Tools: high-speed steel • Cycle Time: 7 seconds

SUN OIL COMPANY, Dept. AM-9
Philadelphia 3, Pa.

I am having trouble possibly caused by an inadequate cutting oil. I would like ☐ the services of a Sun representative; ☐ the booklet "Cutting and Grinding Facts."

Name _____

Title _____

Company _____

Street _____

City _____ Zone _____ State _____

MORE THAN 300 PARTS ARE MACHINED with the aid of *one* cutting oil for tools and hardware items made by Sargent & Co. Raw materials worked are: B1113 steel, 11ST-3 aluminum, ASTM-B140-46 Type B half-hard bronze, B16-46 brass, and Type 416 stainless steel. Stock ranges from ⅛" wire to 2" bars.

SINGLE GRADE OF SUNICUT REPLACES 4 CUTTING OILS

A good example of cutting-oil economy and efficiency is provided by Sargent & Co., well-known hardware and tool manufacturers. Their complete line requires the machining of more than 300 parts from a wide range of metals. A few years ago this company was using four different cutting oils, purchased in drums. By switching to a single product, Sunicut 11W, and buying it in bulk, Sargent has been able to effect an annual saving of about $3,000. All operations are performed as well as before, or better—and shop efficiency is up.

Sunicut 11W is a low-viscosity, dual-purpose cutting oil for automatics machining all nonferrous metals and free-machining steels such as B1112 or B1113. Its transparency permits quick and accurate miking. It will not stain brass or copper under normal conditions. It drains rapidly, minimizing carry-off. And its high lubricating and cooling properties aid in prolonging tool life and improving finishes. Moreover, it protects finished parts from rust and corrosion.

Other Sun cutting oils offer similar opportunities for improved operations and economy. For information about them, or the help of a Sun representative, use the coupon at the right.

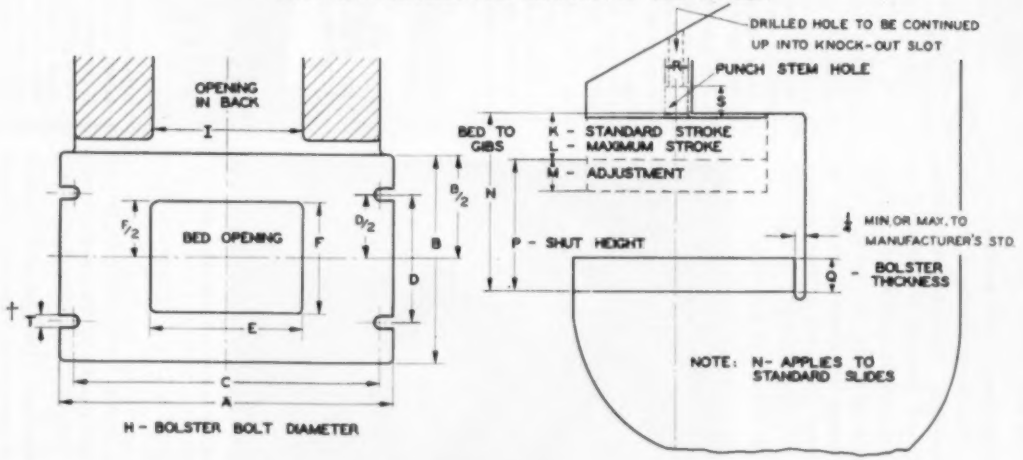
SUN INDUSTRIAL PRODUCTS
SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO & MONTREAL

SUNOCO

Bed Dimensions for OBI Presses

These data for open-back-inclinable presses were developed by the Joint Industry Committee of the Automotive Industry

DIMENSIONS OF BED, BED OPENING, OPENING IN BACK, STROKE, ADJUSTMENT, BOLSTER THICKNESS AND DISTANCE OF BED TO GIBS



† NOTE: MOUNTING HOLES OR SLOTS IN PRESS BED, FOR BOLTING BOLSTER PLATE TO BED, TO CONFORM TO CENTER TO CENTER DISTANCES ON BOLSTER PLATE PLUS ⅛" MAXIMUM, ⅛" MINIMUM CLEARANCE ON ANY ONE SIDE OF SLOT OR HOLE. UNDERSIDE OF SLOT OR HOLE MUST BE MACHINED AND MUST BE PARALLEL WITH TOP OF BED.

TONNAGE	A	B	C	D	E	F	H	I	K	L	M	N	P	Q	R	S
22	20	12	18	7-1/2	8	5	3/4	9	2-1/2	4	2	11-1/4	8-1/2	2-1/2	1-1/2	2-1/4
32	24	15	22	9	11	8	3/4	11	3	5	2-1/4	12-3/4	9-1/2	2-1/2	1-1/2	2-1/4
45	28	18	25-1/2	10-1/2	14	8	1	13	3	6	2-1/2	14-1/4	11	3	2	3
60	32	21	29-1/2	12	16	11	1	15	3-1/2	7	2-3/4	16-3/4	13	3	2	3
75	36	24	33	13	18	14	1-1/4	18	4	8	3	19-1/4	15	3-1/2	2	3
110	42	27	39	18	21	15	1-1/4	21	5	10	3-1/2	23-1/4	18	4	3	3
150	50	30	47	18	21	17	1-1/4	24	6	12	4	28-1/4	22	4-1/2	3	3
200	56	34	55	18	27	21	1-1/4	27	8	12	4-1/2	32-1/4	24	5	3	3

Production News

ABOUT *Lusol*.. —THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY • PORTLAND, CONNECTICUT

"I've never seen anything that works like Lusol!"

The foreman in one of Ohio's finest machine and tool plants pointed out machine after machine "working better with Lusol". "We change this form tool every twenty-four hours, whether it needs it or not," said the day man on a lathe. "Used to make three strokes on a deep drilling operation; do it in one with Lusol," said another.

"Grinding wheels require less dressing, finishes are finer—thread chasing and tapping go fast, without tearing—no dermatitis, no odors, no rusting;" with reports like these all through the shop, no wonder they've practically standardized on Lusol for machining and grinding.

"Look how clean these threads are, and our chasers and taps last a lot longer with Lusol".

★

Stamping with Lusol

This is one of the newer uses for Lusol. Its high film strength gives it lubricating properties under extreme pressure . . . safeguards both the tools and the products while decreasing down time for die maintenance.

Since Lusol contains no oil, parts come off the presses clean, without foreign particles clinging to them. Handling and finishing is easier and less costly. There's no smoking to make surroundings disagreeable. Work and dies run cool.

users say*

case histories of Lusol at work

A GEAR MAKER—Never got more than 4 pieces per hob tooth with the old coolant. Put a 20:1 Lusol solution in our gear hobbers, and now we get as high as 22 pieces per hob tooth.

UNIONS COMPLAINED at too much smoke in a machine shop; insisted on new, powerful exhaust fans which would have required a greatly expanded heating system. Because there's no smoking when you're cutting with Lusol, that was the solution offered.

A PLANT SUPERINTENDENT —"Where have you been for the last two years?" exclaimed this man, when he saw how drilling operations and turning on their Warner & Swasey lathes had been speeded up with Lusol.

A TOOLMAKER—"I haven't found anything that works as well as Lusol on thread chasing and tapping high carbon steels."

*Users' names furnished on request.

FREE BOOK

Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor in machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 215, Portland, Conn.

TALKING SHOP

High-Pressure Department

WE HAD the misfortune to visit a boiler factory on a hot, summer day. But we found one department where, despite air conditioning, the heat is always on. Because every utility engineer has his own pet ideas and improvements, rarely are two central station boilers even alike. This keeps 500 draftsmen and designers busy turning out 2½ miles of blueprints a day (that's 13,200 feet, if you are interested). For one radiant boiler, 137 ft high, we saw the engineering work for the contract. It involved 750 blueprints (100 copies of each), 5 volumes of shop orders, 14 in. of correspondence, and several-score purchase orders. In defense of this lack of standardization, we must admit that improvement is steady. In the last five years, average temperatures have gone up from 900 to 1000 F and average pressure from 1300 to 1900 psi, with some standing at 1050 F and 2300 psi. We have no information on the blood pressure of the shop superintendent.

Scrap Works

RYAN AERONAUTICAL is fabricating pickling baskets from 5/16-in. stainless-steel scrap produced in punching exhaust-system flanges. Baskets cost less than commercial ones, conserve critical material, and last 3 months, as compared with 10 days for wooden ones. They are 62×27× 22 in., can handle up to 1000 lb of stainless jet parts through acid solutions and a high-temperature salt bath. The latter ruled out wooden containers anyway when it was added to the process—burned 'em up. Also, the wooden containers required lead weights—and those had to be jacketed with stainless because the baths attacked the lead.

Big Drop

ALCOA has installed the world's largest spring-suspended drop hammer, a 25,000-lb steam unit, at its Vernon, Calif, plant. The machine is 18 ft high, weighs 75 tons and is set on a 24 x 24 x 21-ft-deep concrete block suspended on a network of steel beams 24 ft under the floor. The beam ends are on spring units capable of supporting 600 tons, and absorbing shock and vibration. Floor load of fork-lift trucks carrying dies, figured at 10 tons max, is carried by a special 30-in. floor beam at the front.

Stitches Save 75%

ALLIS-CHALMERS formerly applied a 28-gage sheet-metal lining to 11 boards of a 14-board sifter frame by prickpunching 40 holes for flat-head nails. Time was 4 min. per board, or 44 min. for the job. Now the metal pieces are prickpunched for a nail at each end, then the guard strips are stitched down with an Acme-Morrison metal stitcher, which applies 30 stitches of 20-gage wire in a minute per board—or 11 minutes for the job. The sheet metal protects the boards against abrasion.

More On Social Security

A SURVEY by the Federal Security Agency of about 15,500 beneficiaries of Social Security payments indicates that two-thirds have little or no retirement income. Only one in eight had *other* retirement income of $50 or more per person (meaning $100 for man and wife). A quarter of the men work to supplement their incomes, but averaged less than $390 for 1951. A fifth of the women worked, but averaged less than $260. Counting all income, almost two out of five had incomes totalling under $50 a person. Money income is not, of course, the whole story, because many of the beneficiaries live with relatives, have gardens, or similar "non-cash income."

In general however, the monthly benefit check has already become a critical item of income. For details of a metalworking survey on the subject, see *AM*—April 14, p 159-164.

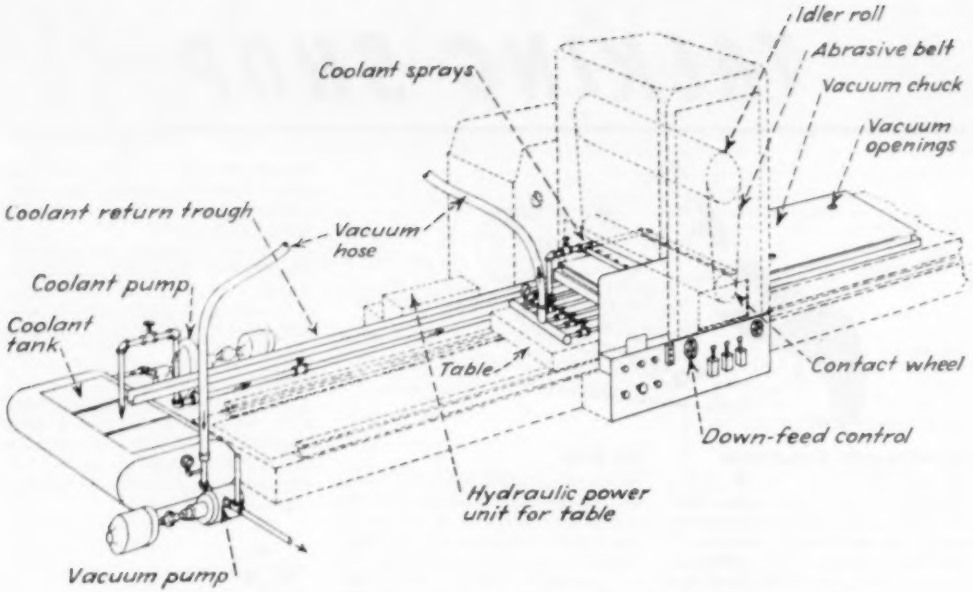
2-in-1

A NEW 22-station transfer machine, made by Snyder, has one station trepanning a 2-in. hole from the solid cast clutch housing. The same toolholder does finish-boring in the same operation.

Strike!

STEEL BALLS for coal pulverizers used in power plants look deceptively like bowling balls until you try to lift one. At Babcock & Wilcox they are produced from billets cut to the proper length and heated in a rotary furnace. The operator removes a billet and places it on a conveyor. The conveyor tips the billet up on end as it is dropped on the bed of the hydraulic press. One short stroke of the press loosens the scale, which is blown away. One full stroke forges the ball.

From here on it gets easy. The ball rolls down to the trim press where the small flash is removed, is ejected into a trough down which it rolls to drop through a hole in the floor and down another trough under aisles to the furnaces. Here an elevator lifts the ball to the top of the first furnace. It rolls off the elevator and through an intricate heat-treating cycle. The designer of this low-cost materials-handling system is undoubtedly captain of the Tuesday-night bowling team.



MODIFICATIONS to standard Hill-Acme polishing machine for tapering aircraft skins included increasing belt speed from 4000 to 6200 sfpm, replacing a 50-hp motor with one of 100 hp, reducing table speed, and increasing capacity of the coolant system to provide a settling tank. Machine as received is shown by broken lines; solid lines indicate modifications

BELT GRINDING TAPERS WING SKINS

Tapered metal sheets are the latest way to save airframe weight by distributing the mass of metal where it is needed to carry the load. Now aluminum and stainless-steel wing and fuselage sections can be tapered with abrasive belts

BY JOSEPH R BURNS Process Research Engineer, BELL AIRCRAFT CORPORATION, Buffalo, N Y

A new method of tapering aircraft wing and fuselage skins shows promise of improving production rates, cutting costs, and increasing aircraft production. In thorough tests of abrasive belt taper grinding, Bell Aircraft Corp, Buffalo, N Y, and The Carborundum Co made use of a modified Hill-Acme polishing machine to determine the relative merits of this process over taper rolling and milling. Results were encouraging—success in holding tolerances on tapered sections was exceptional, ±0.004 in. being maintained on a section with a pitch of 0.0685 in. per foot over an over-all length of 49.7 in. No warping or distortion occurred from heat generation when using a coolant, and surface-finish requirements were met with ease.

A 36-grit, 126×50-in. waterproof cloth belt was used for all heavy rough-grinding tests. Vertical belt arrangement included a Carborundum "61" rubber-faced contact wheel of 90 to 105 durometer hardness to aid in controlling taper thickness and dimensions. Belt speed was 6200 sfpm. Silicon-carbide belts of this grade gave better results than aluminum oxide as far as performance and belt life were concerned. Between 200 and 250 lb of material was removed before the belt lost its grinding efficiency; then it was used as a finishing belt, resulting in satisfactory surface finishes.

Cuts up to 0.100 in. in depth over the entire width of 72-in. aluminum sheet were made in one pass with a table speed of 10 in. per minute. Indications were that about 3 hp per inch of belt is required and that equally heavy cuts can be taken regardless of the width of sheet. Stock was removed in rough grinding down to within 0.010 to 0.015 in. of required sizes, giving a surface finish of approximately 225 mu-in. rms. The belt was then changed to one of finer grit for two or more light cuts to "sparkout" to the required surface finish (100 to 130 mu-in. rms) and final dimensions. Total time to remove about 0.290 in. of material in rough grinding, change belts, then finish grind, averaged 30 min. per sheet including loading and unloading. This is somewhat longer than was anticipated; however, the use of a modified polishing machine not specifically designed or intended for

the removal of heavy amounts of material must be taken into consideration. In all probability, a machine specially designed for this work would take less than half that time. Depending on the amount of stock to be removed and the taper involved, it is believed that belt grinding is 5 to 10 times faster than other methods and, in addition, produces a finished product without subsequent operations.

Sections as thin as 0.035 in. were ground to within ±0.008 in. and it is expected that tolerances of ±0.004 in. will be held on sections as thin as 0.020 in. as the result of the holding powers of a vacuum chuck. A vacuum equivalent to 24 in. of mercury held work during heaviest grinding.

Coolant was 40 parts water to one part soluble oil for all grinding to keep work temperature at a minimum, thus controlling heat distortion, and to wash away the rapid accumulation of chips. Spot checks with a Pyrocomm immediately after grinding showed temperatures to be in the range of 85 to 90 F after cuts 0.100 in. in depth—specifications restrict temperature to 250 F.

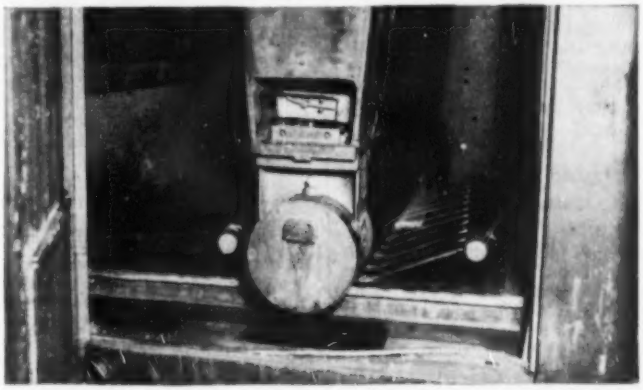
By shearing or sawing sheet material prior to grinding, a considerable amount of material can be salvaged, the diagonal cut produced by sawing being useful for smaller parts of the original thickness. Further, this eliminates grinding large amounts of stock and wearing out abrasive belts unproductively. The aluminum chips produced in grinding can be salvaged, because they are in the same classification as chips produced by other operations.

Simple to Operate

An outstanding advantage of this method compared with other taper-producing processes is that one fairly good machinist and a helper can operate the machine after a little instruction. No long training period is required nor are highly skilled men needed. It is possible to obtain finishes as good as 10 mu-in. rms with a 240-grit belt without variations in pattern, and if straight-line patterns are not desirable, the belt-oscillating mechanism can break it up.

As the relatively inexpensive abrasive belts are discarded when worn out, no cutting-tool maintenance is required nor is there any need for cutting-tool balancing and sharpening. Under test conditions, abrasive costs were found to be from 12 to 15 cents per pound of aluminum removed—considerably lower than known costs for other methods. Under production conditions, costs may be further reduced.

DIAGONALLY CUT SHEET prior to tapering on abrasive belt machine. Work is held on table by a vacuum equal to 24 in. of mercury



GENERATING THE TAPER on sheet material fed from left to right. Spray heads on exit side of belt minimize loading and wash chips away

NO DISTORTION is evident after tapering—spot checks immediately after grinding show temperatures range from 85 to 90 F after a cut 0.100 in. in depth

FINISHED TAPERED SKIN and quantity of aluminum chips removed. Although 48 in. is maximum width possible with modified machine, redesign will probably accommodate all types and sizes

News of Metalworking

Lincoln Takes On Big Moving Job

DETROIT, MICH — Machinery, equipment, and partly finished assemblies being moved from here to the new Lincoln-Mercury assembly plant at Wayne, Mich, constitute one of the largest moving jobs ever tried. Cost of the job will be a million, and completion date is mid-October. Body shops were the first to go, and will be followed by assembly and manufacturing departments.

Hardened Chucks Give Way To Chrome-Plated Ones

BURBANK, CALIF—Lockheed Aircraft is using chrome-plated spinning chucks made of toughened steel to replace old hardened-steel chucks. New chucks can stand vibration, but still have rigid gripping surfaces.

Rare Furnace Conversion

ASHTABULA, OHIO—An oil-burning smelting furnace used for nonferrous materials was recently converted for producing cast iron. The McKinnon Iron Works furnace uses less manpower and produces iron castings of finer grain than coke-burning cupolas.

Soviets Set New 5-Year Plan Goals

MOSCOW—Russia intends to increase output of its machine-building and metalworking industries two times in five years, according to the draft directives for the fifth Five-Year Plan of the Soviet Union.

It plans to expand substantially existing capacities and to develop new capacities for manufacturing big machine tools, cutting machines and presses, as well as precision-measuring instruments and "instruments for automatic guidance of technological processes."

The Soviet Union expects to increase in five years the production of machine tools of higher precision about two times, heavy forging machines and presses eight times, operation and control instruments 2.7 times, and rolling mill equipment more than two times.

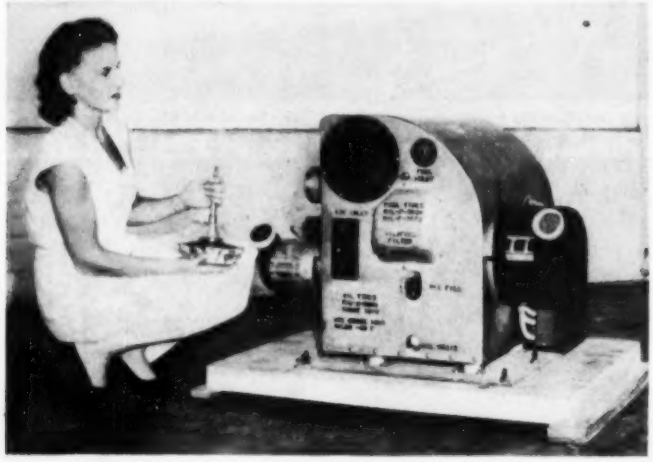
It will enlarge shipbuilding and production of turbines and machine tools in Lithuania; manufacture of electric machinery, machine tools and shipbuilding in Latvia; and production of electric machinery and shipbuilding in Estonia. It further plans to increase substantially the manufacture of hoisting and transport equipment, of machines for mechanization of labor consuming operations, of complete sets of equipment for production of building materials and automatic equipment for light and food industries.

Reduction of weight with improvement of quality is one of Russia's announced purposes in the design of new machines.

Planned increases in production are: steel 62%; rolled metal 64%; electric power 80%; steam turbines 2.3 times; hydroturbines 7.8 times; steam boilers 2.7 times; metallurgical equipment 85%; oil equipment 3.5 times; big metal-cutting machine tools 2.6 times; automobiles 20%; tractors 19%; synthetic rubber 82%.

Non-ferrous metal production is to be expanded in five years by these amounts: Refined copper 90%; lead 2.7 times; aluminum 2.6 times or more; zinc 2.5 times; nickel 53%; and tin 80%.

The growth in the level of industrial production for the five-year period has been put at 70%, with an average annual increase of 12%. The means of production are to be expanded at 13% a year, and means of consumption at 11%. High-speed development of machine building will be the basis of technical progress in all branches of the national economy.



45-HP GAS TURBINE WEIGHING ONLY 60 LB is crated for shipment to Wright Field from Solar Aircraft. Unit is first portable, hand-starting turbine, and will power cargo doors and lifts on transport planes

Industrial Security Put Up to the Worker

WASHINGTON—Plant protection is now under only one government agency — Department of Defense's Munitions Board—instead of three as during the last war. The board's "Your machine is freedom's weapon —protect it" program, started last February, is being bolstered by posters, pay-envelope stuffers, and cartoons for plant publications.

The whole program aims its effort at the individual worker, impressing him that protection of his equipment is his own job. Promotional material signed by various government officials stresses the worker's responsibility for guarding against espionage.

Along with this free material, there are several government-printed pamphlets available, including "Principles of Plant Protection," and "Standards of Plant Protection."

Congressional Exasperation Forces Munitions-Board Shakeup

WASHINGTON—A threat that Congress might establish a fourth military service—that of procurement and supply—is causing some active policy changes in the Department of Defense and in the Munitions Board. Before Congress closed up shop last session, it told the military to clean up—or else.

Military brass fear a civilian buying chief and an independent service of supply because they think the combination might stymie weapons development and might force on them weapons they don't want. Of course, they also fear loss of direct power over procurement. Military men would fight such a threat any time, but the danger to them is even worse now than normally. An election-minded Congress, or a new Congress, is a tough customer.

Congressmen Bonner (No Carolina) and Hébert (Louisiana) were ready to put through legislation that would wipe out Munition Board's functions and establish the fourth service on a par with Army, Navy, and Air Force. Senator O'Mahoney (Wyoming) had an amendment to the '53 military-appropriations act requiring Secretary Lovett to issue new procurement regulations to eliminate duplicate purchasing, which threw cold water on the Air Force hope for its own service of supply for items it uses in common with other services.

Pentagon Reaction

To cut off Congressional action, Pentagon decided to revamp the Munitions Board. Executive Vice Chairman John C. Houston called for a review of activities on the Munitions Board, saying, "Let's not mistake activity for progress." Useless research is being abandoned, and up to 20% of board personnel is being cut off. The board's original function was to be an index for the Defense Department on what support the country can provide the military in material, manufacturing capacity, technical skill, transportation, and industrial production. It will now try to do just this, and will also watchdog the $3½ million the Department of Defense can spend yearly. The board has a new charter, and Chairman Small has new powers.

New Policy

Chairman Small has almost full authority to enforce board decisions on the three services. Their only appeal is a doubtful one to the Secretary of Defense. But the biggest changes are in the military supply-system regulations to be issued September 8. They are rough, but will be cleaned up later:

- Renegotiation and redetermination will be limited by tighter contract pricing. Downward adjustments only will be possible.
- Single-service buying will be expanded.
- Commercial facilities like warehouses, garages, bakeries, and laundries will be made available to all services, regardless of who owns them.
- Commercial standards and specifications are to be used whenever possible—unless they are impracticable or uneconomical.
- New or expanded supply systems will not be allowed after Sept. 8.
- Machine tools and production equipment now held in reserve must be put to use before more can be ordered. First priority in purchasing equipment will be for current needs, second for reserve or excess-capacity tooling.
- Private financing of production facilities will be encouraged, and government expansion will be discouraged.
- Professional military procurement specialists will be trained; they will have promotion, rotation, and retirement rights equal to line officers.

Microwave Radio Going into Industry

NEW YORK — Federal Telephone and Radio Co reports that it has built or received orders for 5500 miles of private microwave radio relay systems, used for communications and for metering and controlling circuits for remote operations.

DISTRIBUTORS NAMED

Detroit Die Set Co has announced Brown-Warrick Co, Hamilton, Ont, as agents in the Niagara area.

Dollin Corp has appointed Robert C Kleindinst, Buffalo, N Y, to manage sales of die castings in upper New York and Penna.

Harbor Mfg Co has designated Don T Galvin, Detroit, Mich, as Ohio representatives for the line of steel drop forgings.

Hartford Special Machinery Co has appointed Macaulay Machy Co, Schenectady, N Y, to sell drilling and tapping equipment.

Hall-Scott Motor Div, ACF-Brill Motors Co has appointed Western Tool & Mfg Co, Casper, Wyo, to handle industrial engines.

Jerpbak-Bayless Co has indicated that Crown Tool & Supply Co, Chagrin Falls, Ohio, will sell their gear-grinding wheels.

Kingsbury Machine Tool Corp has appointed Four States Machinery Co, Chicago, as representative

R K LeBlond Machine Tool Co has designated C J Carter, Machinery, to cover sales in Houston, Dallas, and Ft Worth, Texas.

Nebel Machine Tool Co has designated J Lee Hacket, Detroit, to sell lathes in Michigan.

Ohio Machine Tool Co has picked Nichol Machinery Co, Milwaukee, as Wisconsin distributor.

Precision Metalsmiths, Inc, has announced representatives for investment-castings sales: C B Lawrence Co, Pittsburgh, (western Pennsylvania and western W Virginia); Bader Tool & Engineering Co, Minneapolis, (Minnesota and western Wisconsin); and David T Applebee, Grand Rapids, Mich, (western Michigan).

Rivett Lathe & Grinder Co has announced Paul-Munroe Co, Bell, Calif, as southern California representative.

Scully-Jones & Co has picked Hoffman-Baumruck Co, Philadelphia, as representative in eastern Pennsylvania, southern New Jersey and Delaware.

Standard Pressed Steel Co has indicated that Marshall Moorhouse, New York; Walter H Cunnington, St Louis; and James C Humphries, Los Angeles, are representatives.

Titeflex, Inc, has announced Salsbury Corp, Los Angeles, as West Coast representative for its line of connectors and conduits.

Worcester Pressed Steel Co has picked Ralph H Cockroft, Pasadena, Calif, as representative.

Ceramic Fiber Stands Jet-Engine Heat

NIAGARA FALLS, NY—Carborundum Co has announced a vitreous ceramic fiber only four microns thick (silk is 18) that will stand 2300F and may possibly be worked into insulating material for jet engines. It can be woven into filters, bonded into panels, and combined with asbestos. Weight is only 2 lb per cu ft. It is now being tested by the Office of Naval Research.

Diamond Recovery Pushed

DETROIT—Diamond bort, now a critically short tool-grinding medium, is being recovered by a central depot established by Chrysler's salvage program. This follows a nation-wide NPA program for economy and salvage of industrial diamonds.

Kaiser Increases Aluminum-Ingot Size

SPOKANE, WASH—Raw ingots of aluminum with 32-in diameters or more will be cast next year with a new method involving rapid chilling. Kaiser Aluminum & Chemical Corp expects larger ingots to allow larger aircraft castings to reduce costs, increase strength. Present max ingot dia is 12 in.

Railroads and Smart Boat Handling Insure Normal Winter Ore Supply

WASHINGTON—The steel industry's contention that there will be enough iron ore on hand this winter to support full-scale steel production has been backed by government observers.

The worry was that the walkout of ore miners would have resulted in calamity this winter when midwestern and eastern steel plants would run out of ore. During the strike peak, ore movements were as low as 3% of normal. Ore losses were over 20 million tons, half of which would have gone into stock for December-to-April use.

NPA estimated at the close of the strike that steel would not be abundant again until April '52, and decontrol wouldn't be possible until July '53. But the new estimate on winter iron-ore supplies may bring decontrol by April.

Steel prepared for the end of the strike by keeping about 60 ore boats at the head of Lake Superior, near loading docks, to renew ore flow at the earliest moment. By July 31, five days after the settlement, over a million tons of ore had been dispatched.

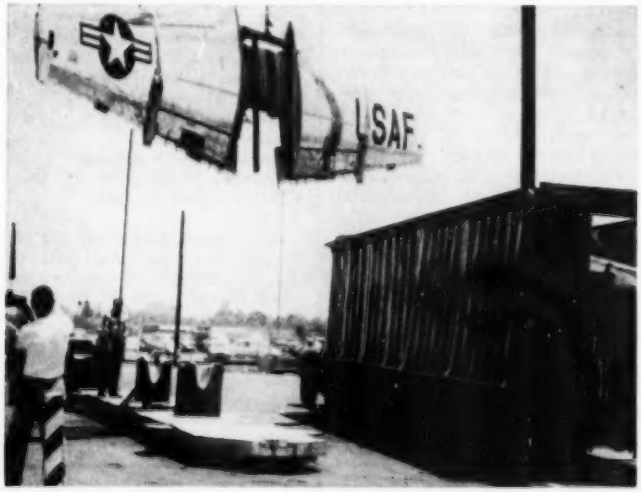
Coast Guard is expected to extend the "emergency summer load line" through October 1. This will allow deep loading of the ore boats in a season when it is normally not allowed. Coast Guard may also consider ice-breaking operations.

Rail Cooperation

Rail lines serving the Mesabi Range in Minnesota have set up a pool of cars earmarked exclusively for all-rail ore shipments. First shipment was made on July 29, and a daily shipment of 450 cars is expected to deliver over four million tons of ore by the end of the shipping season.

The highest weekly rate of shipment in history was reached in mid-August—3,280,094 tons (previous high was 3,258,328 in August '43). However, last season's total shipment of 89 million tons will probably not be reached, even if this weekly rate is maintained.

If ore supplies are plentiful next spring, as most people expect, it will have been demonstrated to the steel industry that a carry-over of 20 million tons of ore into the next shipping season won't be necessary, thanks mainly to the increased speed and capacity of the newer ore boats.



BEECH WING FOR LOCKHEED T-33 JET TRAINER is unloaded from special cross-country van in California after trip from Kansas. Top of 42-ft van opens completely so four wings can be lifted with crane. Wing is one of 97 subassemblies made by subcontractors for Lockheed

Copper and Tin Stocks Look Much Better

WASHINGTON—Although a Munitions Board report notes that copper is still in short supply, NPA has reported to an advisory committee of brass- and copper-foundry people that the supply of refined copper is now in balance with demand. In fact, foundrymen say their problem now is in getting orders. Allocations are evidently adequate at the moment. As far as aluminum goes, expansion goals will be met by the second quarter of next year.

Tin looks better than any time since the start of controls. Foreign tin purchases by the government are getting good delivery—some even ahead of schedule. The reopening of the foreign market to private buyers should increase tin supplies (foreign tin could recently only be bought by RFC). Controls will stay in effect for a while, though, because stockpiling is considered essential.

CIO Family Plan=United Power

WASHINGTON—CIO international of electrical, radio, and machine workers has been given jurisdiction—for the present, at least—over Avco Corp's new Crosley plant near Cincinnati. The CIO automobile workers, which at first claimed jurisdiction but bowed to IUE-CIO, will help IUE-CIO organize the plant.

This was the CIO's "family plan" for settling jurisdictional disputes in action. And it offered additional evidence of increasing efforts by labor unions to reduce jurisdictional strife by their own action, outside the Taft-Hartley labor law.

How it works

The CIO plan for settling disputes between CIO unions "within the family" is based on a "CIO agreement governing organizational disputes" approved by the CIO convention last November. Each of the 34 CIO unions signed a formal contract, enforceable in court, agreeing to abide by the plan.

Dr George W Taylor, the country's top arbitrator and one-time head of the National War Labor Board and Wage Stabilization Board, was named CIO organizational disputes director last February. So the plan really has been functioning less than six months.

Twenty-six jurisdictional disputes have been handled by CIO under the "family plan." Only seven had to be decided by Taylor. Ten were settled directly by the unions involved. In others, rival unions simply withdrew their claims, leaving the plant involved to one CIO union.

Alan Haywood, CIO executive vice president and organizational director, is running the machinery, aided by ex-UAW-president R J Thomas.

If the top union officials can't agree, then the dispute goes to Taylor for decision. This happened at the Westinghouse plant at Columbus, O, where IUE got the decision over UAW, and at two Dayton plants—Hawker Manufacturing Co and Eureka Tool and Die Co—where UAW got the nod over CIO president Philip Murray's own steel union.

Haywood feels it is essential to the success of this plan that the CIO international unions exercise their authority over recalcitrant locals and back up Taylor's decisions, as the UAW-CIO did in this instance.

Haywood is trying to speed up the "family plan" procedure, particularly where non-CIO unions are involved in the situation. He would like to give the unions a time limit of one week to settle or disagree and thereby move the issue immediately to Washington, where Taylor can be brought in on the top-level conferences if necessary.

Scrap Price is Up But Supplies are Good

CLEVELAND—Best-informed sources here state that there is no serious danger of a scrap shortage for the next several months, at least. Dealer inventories were high toward the end of the steel strike, and many were in financial trouble because they had to keep buying scrap, but could not ship it. Now, scrap is moving to mills, where it is being used and stockpiled for winter use. Talk of shortages in a few weeks will be caused only by temporary hitches in the supply line, not by actual supply shortages.

Personnel Overhead Drops

NEW YORK — American Management Association reports that the number of people in personnel departments per 100 production employees has dropped a second year. The ratio now stands at 0.61.

Metalworking Abroad

(By McGraw-Hill World News)

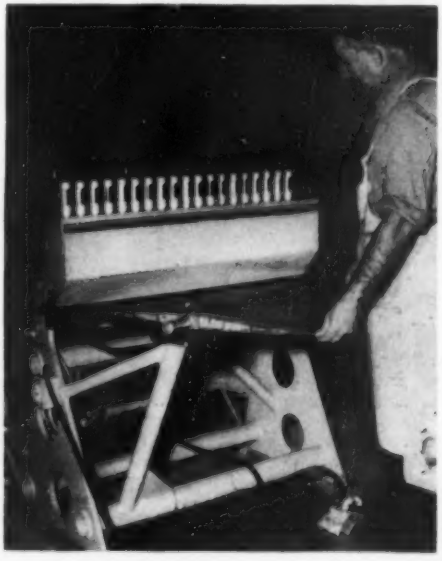
Canada Will Build Trainer Jets—to power T-33's Canadair, Ltd, is producing in Dorval, Que. Rolls Royce has $25-million order for the power plants—largest single order in British aircraft industry. Condition of contract was establishment of emergency production facilities in Canada, so Canadair will make tail end of engine order.

Germany Leads in Exports to Argentina—to recoup losses of sales during the war. Agricultural machinery and trolley buses are among Argentine imports.

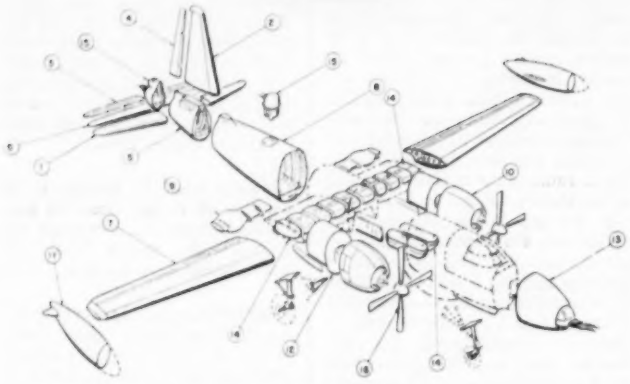
Hungary Saves Copper—by ordering that only the top layers of electric-motor contacts may be copper. Shortages are caused by partial cutoff from Western Zone and inability of Russia to ship copper to satellite nations.

Spain Limits Tractor Imports—but the reason isn't to limit outside purchases. Gasoline is scarce, so only oil-burning tractors will be allowed into the country.

Mexican Auto Plants Curtail Output—to avoid a threatened quota imposition by the government. GM, Ford, and Chrysler are cutting production 20% from 47,000 units per year at branch plants in Mexico.



ELECTRIC CONTROLS AND 19 KELLER AIR-FEEDRILLS take 34 seconds to drill 26 holes in fin for guided missile. Drill units are fixtured to operate in different patterns. Operator next turns fin over and drills only 7 holes in trailing edge of fin



CHANCE VOUGHT
EMPENNAGE & AFT FUSE SECT CONSISTING OF...
1. HORIZONTAL STABILIZER ASSEM
2. VERTICAL FIN ASSEM
3. ELEVATORS & TAB ASSEM
4. RUDDER & TAB ASSEM.
5. AFT FUSE SECT. ASSEM
6. VARICAM ASSEM

TEXAS ENG & MFG. CO
7. OUTER WING ASSEM. INCL. TIPS

KAISER MFG
8. WAIST BODY STRUCTURE
9. CENTER SECT. FLAPS

ROHR
10. POWER PLANTS
11. WING TIP NACELLES

SOLAR
12. NACELLE BARRELS

RHEEM
13. FUSE. NOSE ASSEM

INDUSTRIAL FABRICATORS
14. FUEL CELLS

GOV'T FURNISHED EQUIP'T
15. WAIST & TAIL GUN TURRETS
16. PROPELLERS

Subcontracting Speeds Navy's P2V

BURBANK, Calif. — Lockheed Aircraft Corp believes in large-scale subcontracting as a means of speeding production. Ninety-seven different assemblies or major parts of its airplanes are now manufactured by other companies in a subcontracting program expanded 21.4% this year.

Value of the program for its California operations has grown to a current total of $255 million worth of contracts—more than half of the company's $456-million total orders for purchase of aircraft ingredients and allied items.

51% of the huge P2V Neptune, Navy anti-submarine bomber shown in the drawing above, is built by other companies. Large sections of wings, fuselages, and tails are made elsewhere and shipped to Burbank for final assembly into completed planes. Dotted lines indicate key forward fuselage and center sections built by Lockheed; equipment such as propellers, engines, turrets, and armament are government-furnished.

In addition to nine firms subcontracting major assemblies, some 4000 suppliers (including 3000 small businesses) pour parts and equipment into Lockheed warehouses.

Major gains cited by the company as a result of the program include rising output of both military and commercial planes with relatively small increase in factory space, and the fact that available manpower can be utilized in less-critical labor areas. Diversion was accomplished with no slump in production, but rather with a steady acceleration.

Anticipating the need for rapid production expansion, Lockheed set up an outside-manufacturing organization in mid-1950. In October, the first major aircraft unit was subcontracted; six months later, first deliveries arrived at the factory.

To implement the program, Lockheed increased production ahead of schedule to provide a cushion of airplanes—from 10 to 20 on each model—during transfer of tools to the subcontractor. From 25 to 30 key foremen from each subcontractor studied manufacturing methods at the company's factory before the switchover. A Lockheed staff of three to five engineers and inspectors joined each subcontractor to help initiate and maintain production.

Some of the special projects required to activate the program on the P2V:

- Rescheduling approximately 30,000 shop orders to provide a cushion of parts and permit tool transfer.
- Transferring 15,200 individual tools to subcontractors.
- Shipping 556,000 individual parts and assemblies to assist initial production, plus transferrance of $4 million worth of raw materials.
- Preparing and maintaining 375 source books and 455 manuals covering purchase and process specifications, assembly charts, and other engineering and manufacturing information.

Small-Firm Open-Time Data Supplied to Prime Contractors

ALBANY, NY—The NY State Dept of Commerce is gathering information from 2500 metal-working concerns which have filed machine-tool inventories indicating their interest in defense subcontracts.

Each firm is requested to report man-hours expected to be open on specified, critical machine and production tools during the October-December quarter. Estimate is expected to ease bottlenecks in certain machining operations, as well as to aid state industry in achieving peak production.

More than 1500 holders of prime contracts throughout the northeastern states will be supplied with reports on available machine capacity in the state. This third quarterly survey has almost doubled its original list of 800 larger firms who are interested in farming out portions of their contracts among smaller shops.

Prime contractors were notified in June of an estimated 3 million man-hours of capacity expected to be available for 41 different machine tooling and production operations during the July-September period.

Servel Gets New Wing Order

EVANSVILLE, Ind.—Servel, Inc, has been awarded its second multi-million dollar contract to make F-84 Thunderjet fighter bomber wings for Republic Aviation Corp.

Wings will be manufactured in a new plant completed last December; production has reached 60% of capacity, will reach 100% by fall.

Servel is now the largest producer of military plane wings in the world, according to Under-Secretary of the Air Force Roswell L Gilpatric. The large-scale wing program is expected to extend through 1955 at least.

LATEST DEFENSE CONTRACTS

ARMY ORDNANCE AWARDS

Chicago Ordnance District

Badger Meter Mfg Co, Milwaukee, Wis.—fuzes, $1,808,000.

International Harvester Co, Chicago—trucks, $1,443,092.

Bell & Howell Co, Chicago — periscopes, $2,354,010.

National Pressure Cooker Co, Eau Claire, Wis.—fuzes, $1,573,200.

Detroit Ordnance District

Parsons Fabricating Co, Traverse City, Mich.—head assys, $454,025.

General Motors Corp, Ternstedt Div, Plymouth, Mich.—range finders, $8,997,307.

Detroit Display & Cabinet Co, Detroit — demolition chests, $125,022.

Reo Motors, Inc, Lansing, Mich.—trucks, $44,443,930.

Continental Motors Corp, Detroit—engines, $668,985.

Rock Island (Ill.) Arsenal

Angelus Sanitary Can Machine Co, Los Angeles—tube assys, $115,665.

Birtman Electric Co, Rock Island, Ill. — indicator assys, $161,264.

Cherry-Burrell Corp, Cedar Rapids, Iowa—recoil assys, $267,291.

Gram & Westergaard, Chicago — recoil mechanisms, $123,905.

Ordnance Tank Automotive Center, Detroit

Willys-Overland Motors, Inc, Toledo, Ohio—cargo trucks, $1,403,074.

Brown & Root, Inc, Houston, Texas—engine assys, $1,095,000.

Chevrolet Motor Div, General Motors Corp, Detroit—trucks, $3,302,288.

International Harvester Co, Washington, DC—trucks, $2,080,091; buses, $1,241,208.

Pressed Steel Car Co, Trailer Div, Chicago—trailers, $7,598,945.

Fontaine Truck Equipment Co, Birmingham, Ala.—semitrailers, $135,880.

Fruehauf Trailer Co, Detroit——trailers, $572,122.

Linn Coach & Truck Div, Great American Industries, Inc, Oneonta, NY — trailers, $526,151.

White Motor Co, Cleveland—trucks, $1,099,-180.

Hyde Corp, Fort Worth, Texas—semitrailers, $4,236,900.

Kentucky Mfg Co, Louisville, Ky.—semi-trailers, $322,654.

LaCrosse Trailer Corp, LaCrosse, Wis.—semi-trailers, $223,155.

Fargo Motor Corp, Detroit—trucks, $4,626,-985.

GMC Truck & Coach Div, Pontiac, Mich.—trucks, $791,979.

Ford Div, Ford Motor Co, Washington, DC—trucks, $924,974.

Henney Motor Co, Freeport, Ill.—light ambulance trucks, $762,660.

Autocar Sales & Services Co, Ardmore, Pa.—trucks, $343,210.

NAVY AWARDS

Philadelphia General Stores

Pacific Valves, Inc, Long Beach, Calif.—steel gate valves, $120,521.

Champion Lamp Works, Consolidated Electric Lamp Co, Lynn, Mass.—lamps, $106,742.

Aero Metal Furniture Corp, Huntington, W Va.—folding chairs, $102,525.

Tri-Clover Machine Co, Kenosha, Wis.—return bends for shipboard use, $107,159.

Hammond Brass Works, Hammond, Ind.—valves, $122,367.

Crane Co, Philadelphia—valves, $227,249.

McCambridge Taylor Co, Philadelphia — valves, $248,580.

Navy Purchasing Office, Washington 25, DC

Lewis-Shepard Products, Inc, Watertown, Mass.—pallet trucks, $106,148.

Market Forge Co, Everett, Mass.—pallet trucks, $117,306.

LaCrosse Trailer Corp, LaCrosse, Wis. — truck trailers, $139,316.

Clark Equipment Co, Buchanan, Mich.—trucks, forklift, $1,426,464.

Leonard Keller Products, Ferndale, Mich.—metal cases, $107,927.

Ohio Galvanizing & Mfg Co, Niles, Ohio—industrial trailers, $112,288.

Gerlinger Carrier Co, Dallas, Ore.—forklift trucks, $298,165.

Rapids-Standard Co, Grand Rapids, Mich.—gravity conveyors, $112,487.

Grove Controls, Inc, Emeryville, Calif.—air test regulator sets, $129,625.

Electric Wheel Co, Quincy, Ill.—warehouse trailers, $130,830.

Yards & Docks Supply Office, Port Hueneme, Calif.

Pioneer Engrg Works, Inc, Minneapolis, Minn.—roll-type, belt-driven crushers, $145,752.

LeRoi Co, Milwaukee, Wis.—trailer-mounted compressors, $153,039.

Murray & Tregoothe Inc, Quincy, Mass.—outboard propulsion units, $156,730.

Sicard Industries, Inc, Watertown, NY—truck-mounted snow plows, $156,233.

Harnischfeger Corp, Milwaukee, Wis. — cranes, $656,106.

Industrial Brownhoist Co, Bay City, Mich.—cranes, $210,000.

Rome Grader Corp, Div, Pettibone Mulliken Corp, Rome, NY—motorized rock graders, $215,855.

John H Hollingworth, Clifton Heights, Pa.—generator sets, $313,289.

Northwest Engrg Co, Chicago — cranes, $515,105.

Herbert Bros, Troy, Ohio—generator sets, $689,264.

D W Cran & Sons, Inc, Minneapolis, Minn.—generator sets, $692,273.

Radio City Products Co, Inc, New York—frequency meters, $661,189.

Mechanical Products, Inc, Jackson, Mich.—circuit breakers, $126,889.

LeRoi Co, Milwaukee, Wis.—compressors, $107,755.

ARMY SIGNAL CORPS

Electronic Supply Office, Great Lakes, Ill.

General Electric Co, Schenectady, NY—tubes, $229,544.

Radio Corp of America, Harrison, NJ—tubes, $149,565.

General Electronics, Inc, Paterson, NJ — tubes, $180,960.

Raytheon Mfg Co, Power Tube Div, Waltham, Mass.—tubes, $150,200.

Hytron Radio & Electronics Co, Salem, Mass.—tubes, $146,700.

Amperex Electronics Corp, Hicksville, LI, NY—tubes, $412,006.

Sylvania Electric Products, Inc, New York—tubes, $267,575.

AIR FORCE AWARDS

Aviation Supply Office, Philadelphia 11, Pa.

Simplex Time Recorder Co, Gardener, Mass.—time stamps, $105,468.

Garley Mfg Corp, New York—accessory kits, $461,893.

Hewlett-Packard Co, Palo Alto, Calif.—signal generators, $294,000.

Weber Aircraft Corp, Burbank, Calif.—seat assemblies for aircraft, $153,782.

Permutit Co, New York—drinking water kits, $118,090.

Air Materiel Command, Dayton, Ohio

Wollensak Optical Co, Rochester, NY — cameras, $168,876.

S Buchsbaum Co, Chicago—buffer panels, $309,888; survival kits, $272,125.

Goodyear Tire & Rubber Co, Akron, Ohio—wheel & brake assys, $287,279.

White-Rodgers Electric Co, St Louis, Mo.—compasses, $175,653.

United Aircraft Corp, Bridgeport, Conn.—skid installation kits; fuel tank installation kits, $168,996.

US Gauge Div, American Machine Metals, Inc, Sellersville, Pa.—transmitters, $333,924.

Trad Television Corp, Asbury Park, NJ—radio receivers, $1,315,447.

Sprague Eng & Sales Corp, Gardena, Calif.—test stands, $855,334.

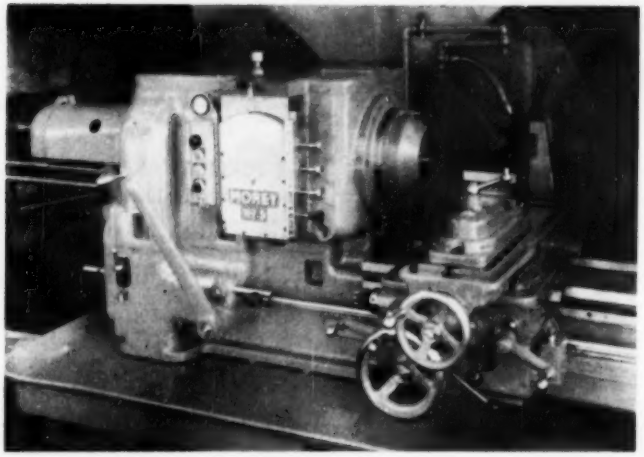
Hevi-Duty Electric Co, Milwaukee, Wis.—regulators, $148,075.

Hartman Electrical Mfg Co, Mansfield, Ohio—cutouts, $158,350.

Burton-Rodgers, Inc, Cincinnati, Ohio — animated panel mock-ups, $146,807.

"Number One," first B-47 Stratojet midship fuselage section built by Oliver Corp, Battle Creek, Mich., under a Boeing subcontract gets a send-off from management, labor, and Boeing executives. The 45-ft-long section, first off the production line, was completed in a plant built to make printing presses and taken over last year by the farm machinery company.

New Shop Equipment



Morey Turret Lathe Has Instant-Shift Planetary Drive

Instantaneous speed change made possible by a newly developed planetary drive, coupled with infinitely adjustable speeds from 32 to 1600 rpm, are the major design improvement in the newest and largest Morey No. 5 turret lathe.

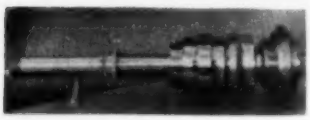
The planetary drie is designed around the spindle and is readily removed, intact, for maintenance by removing the front cover plate on the headstock. Action of the planetary drive is provided by hydraulic pressure. Five buttons, placed conveniently for the operator, operate selector valves which control spindle speed and direction. The buttons provide "stop, high, medium, low and reverse", and it is possible to shift instantly from "high forward" to "reverse". Full operation of the planetary drive is based on various combinations of two brakes and two clutches in the unit. Timken roller thrust bearings at the spindle front and rear permit the machining of heavy parts at high speeds within very close tolerances.

In addition to the planetary drive, there is an infinitely adjustable speed control which is operated by a single handle and includes a large, readily visible chart. Both the speed changer and the speed control are placed within easy reach of the operator's left hand as he stands in normal working position. By varying the speed control in any range, it is possible to maintain constant surface speed during facing or cutoff.

The No. 5 is the largest in the Morey line, having a bar capacity of 2½ in. × 14-in. turning length and a chucking capacity of 15-in. dia. The cross-slide provides universal movement and has power feed, as does the turret. Standard motor is 15 hp, but larger motor can be provided as special equipment.

Included as standard equipment on this lathe are an automatic turret binder which is automatically unlocked, unclamped, locked, and clamped by the motion of the turret carriage, positively located by locating pin, and a quick-acting, 4-way, cross-slide turret. Also included are coolant tank in base and heavy-duty coolant pump.

Morey Machinery Co, Inc, 410 Broome St, New York 13, N Y.



Planetary drive—spindle assembly provides stop, high, medium, low, and reverse speeds

Button-head hexagon socket screw is made of alloy steel and heat treated. It can be used without loss of strength in place of screws with higher heads, many of which have sharp, dangerous corners. It is made of seven thread diameters: No. 8, No. 10, ¼ in., 5/16, ⅜, ½ and ⅝. All except the ½ and ⅝, which are produced in the National Coarse series only, are available in both National Coarse and National Fine threads. The different diameters, all threaded to the head, come in four to seven lengths.

Standard Pressed Steel Co, Box 875, Jenkintown, Pa.

Heavy-Duty Tachometer Heads Measure Extra-Low Speeds

Heavy-duty tachometer heads measure speeds as low as a fraction of an rpm. Built-in gearing permits direct engagement of very low speeds without need of speed changing drives. Speeds up to 199 rpm for full scale indication can be measured.

The stainless-steel head shaft is ¾ in. dia and is supported in large, sealed ball bearings The head casting is anodized aluminum, having ⅜-in. wall and heavy mounting feet.

All working parts and terminals are enclosed against dirt, abrasives, and splashing liquids. Electrical connections between the head and speed indicator can be up to 1000 ft or more, and provisions are made for employing conduit or armored cable. Connections to the head can be made from any one of four approaches and the head can be mounted in any position. Permanent lubrication for an extreme temp range is employed throughout. All heads of the same type number are interchangeable and require no special matchings.

Metron Instrument Co, 432 Lincoln St, Denver 9, Colo.

Materials and Parts

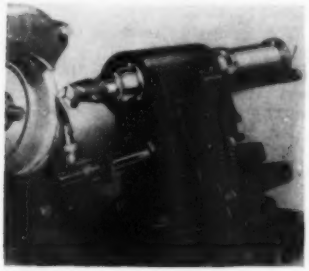
Air-Powered Bench Riveter

The air-power riveter can be used for riveting, de-riveting, punching, forming, and stamping merely by changing tools. Although designed for bench installation, it can be installed on either a base or a stand. A single air-line connection is all that is required. A standard foot control is furnished, but either a hand or automatic control may be used.

A regulator and gage for controlling operating air pressure up to 125 lb regardless of line pressure, is furnished at extra cost.

The riveter is 16-in. high over-all, weighs 37 lb, and has a throat clearance of 3½ in. Air-line pressure of 100 psi produces a working pressure of 1100 lb with 11/16-in. stroke.

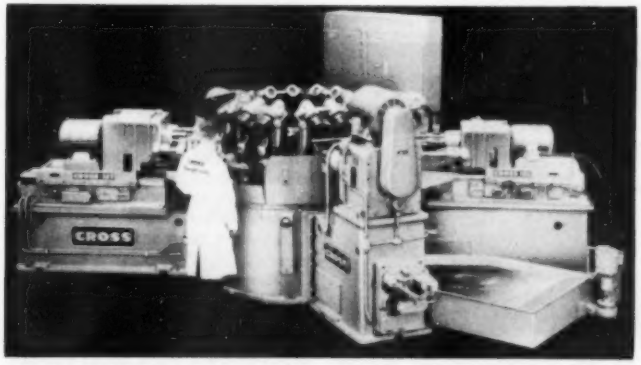
Barrett Equipment Co, 21st & Cass, St. Louis 6, Mo.



Sub-Base for Sharpening Fixture Used for Clearance Angles

A feature of this device is its ease and simplicity of operation. As the hinged sub-base is raised or lowered, the peripheral clearance of the end mill being sharpened is changed accordingly. An arm at the side with graduated notches indicates the degrees of clearance and guides the operation. If the setting on the arm is 10°, for example, the angle produced on the end mill will be 10°.

Weldon Tool Co, Cleveland, Ohio



SPECIAL MACHINE TOOL FOR TANK PARTS works on cast armor of Rc 35 hardness. It drills, chamfers, and taps four holes and drills, chamfers, and reams one hole in tank intermediate- and rear-wheel arms. Production of 64 pieces per hr is possible. Of these, 32 are right- and 32 left-hand arms. A duplex work-holding fixture holds one right and one left-hand part in each of stations. The machine is a dial index, table type. — *The Cross Co., Detroit 7, Mich.*

...INCLUDING

Large-bed punch press has electrically operated clutch control and herringbone gears page 165

Double-action, straight-side press has motor adjustments to inner and outer slides.....page 166

Boring, internal profiling of jet-engine parts is being done using special machines and matrix to support boring bar page 168

Gap lathe speeds machining of jet-engine exhaust cone flanges by using a single setup for both ends ..... page 172

Roller coater to apply die lubricant to sheets has automatic infeed and 3 sets of rolls page 172

Variable-speed transmission operates at 1800-rpm input without added spring loading....page 174

Abrasion tester rates the wear resistance of finishes by using an abradent wheel ..... page 176

...and in Sept 15

Optical level for measuring flatness, straightness, and parallelism reads deviations to 0.00001 in. per inch of length

Profiler-miller uses 15-hp motor, a vibration-damped crossrail, and centralized one-shot lubrication

Thomas & Betts Cable Cutter Has Heart-Shaped Jaw Opening

A feature of this cable cutter is the heart-shaped design of the jaw opening, which results in clean, accurate cuts free from jagged ridges across the center of the cable. The cutter can be used on both bare or insulated copper or aluminum cables up to 500,000 CM. Outside insulation dias can be up to 1½ in.

The tool provides a mechanical advantage of 18 to 1. The heart-shaped opening progressively decreases the effort required, since it forces cable in toward the fulcrum as more strands are cut. Stops on the handle maintain a min opening of 3 in. to prevent barking of knuckles.

Thomas & Betts Co, 16 Butler St, Elizabeth, NJ

Stainless-Steel Fitting Quickly Coupled to Pipe

The Quikupl stainless-steel fitting has been developed by Peter A Frasse & Co, New York, and Cooper Alloy Foundry Co, Hillside, NJ. It can be joined to tube or pipe without threading, flaring, sweat-soldering, brazing or welding. The pipe or tube is simply cut to length, deburred, and inserted in the fitting. The coupling is completed merely by setting a small screw.

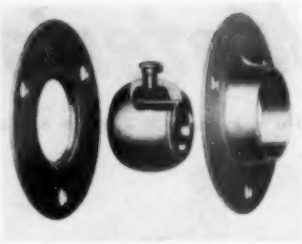
Inside the fitting is a synthetic sealing ring which is contained in a groove machined into the bore. This resilient seal is constructed so that it will provide a squeeze fit regardless of commercial tube and pipe tolerances. Pressure in the line, from either direction of flow, jams it into a positive fit and seals any space between the fittings and the tube or pipe.

The fittings are made in tees, couplings, 45°- and 90°-ells, and adapters in Type 304 and 316 stainless. They are for use at temps up to 275 F, depending on corrosive agent involved, and 150 psi.

Peter A Frasse & Co, 17 Grand St, New York 13, NY

Free-flowing brazing alloy, known as Phos Copper, is available in paste form. An alloy of copper and phosphorus, its fluidity and wetting properties are good capillary action that enables it to penetrate tight-fitting joints to form a strong, ductile bond. On most copper applications, no flux is required. The paste is finely powdered Phos-Copper suspended in a petroleum jelly. A small amount of this paste is placed between the pieces being joined to take the place of a brazing rod, and the joint need only be heated until the brazing filler metal flows. It is packaged in collapsible 1-lb tubes and in 5- and 30-lb cans.

Westinghouse Electric Corp, 306 Fourth Ave, Pittsburgh 30, Pa.



Self-Aligning Sleeve Bearing

Comapct, self-aligning sleeve bearing is specially designed for light shaft duty and power take-off application. Flange mounting is made of 16-gage steel which is press-shaped to conform with the spherical shape of the ball assembly. The ball assembly is a machined cast-iron hollow ball in which an oil reservoir is formed when the bushing is pressed into place. The reservoir is packed with SAE No. F-11 wool felt which becomes saturated with oil as the reservoir is filled. Oil is fed to the bearing surface by capillary action of the sintered or graphited bushing, whichever is required. Heat increases the capillary action, thus providing a self-lubricating feature.

The bearing assembly measures 3½ in. in dia x 1¼ in., and is available with sintered bushing for shaft sizes ½, ⅝ and ¾ in.

Randall Graphite Bearings, Inc, 1011 S Greenlawn Ave, Lima, Ohio

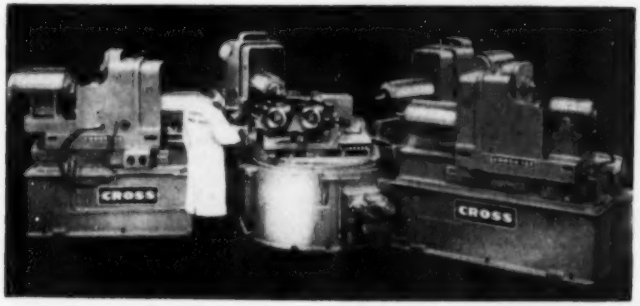
Air-Hydraulic Staking Tool

Designed to operate on regular shop air pressures of 75 to 150 psi, this tool puts two tons of pressure behind the installing dies. It is direct coupled, without toggle links, pivot pins, levers, or cams. Since there is no mechanical linkage to wear, the dies always close all the way.

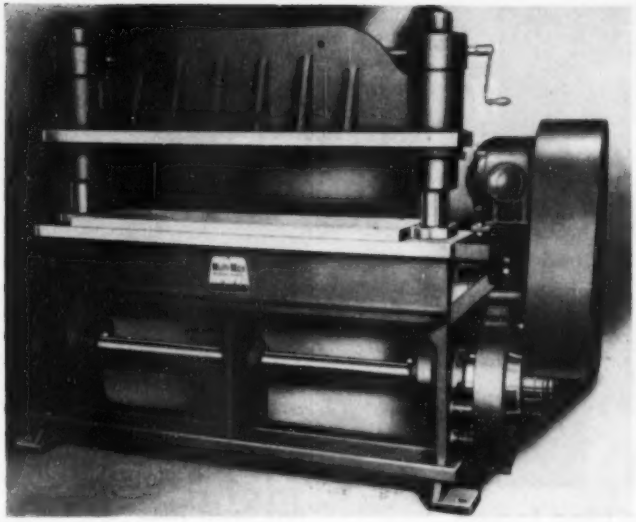
Intended for production-line installation of terminals, the tool can be bench-mounted or hand-held, and actuated by either a finger trigger or a foot valve. It weighs only 40 oz.

Interchangeable dies install bare or self-insulated Sta-Kon terminals on AN or AWG wires, No. 22 through No. 10. Dies are spring-loaded to hold terminals while the wire is inserted, or they can be made self-opening.

Thomas & Betts Co, 16 Butler St, Elizabeth, NJ.



SPECIAL MACHINE TOOL finishes hourly six tank suspension support housings of cast armor with 42 Rc. Operations include rough and semi-finish boring a multi-dia hole and forming two snap ring grooves. After completion of one bore, fixture is indexed and operation is repeated. Index table has one station for loading, three for boring, and one for grooving. Features include hydraulic feed and rapid traverse; pre-set tools; automatic, gravity-operated cam clamping for index table. — *Cross Co, Detroit, Mich.*



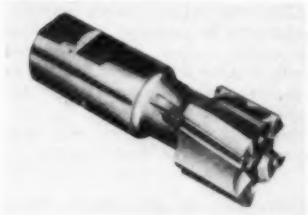
Electric Clutch Control on Large-Bed Punch Press

Diamond Model 3060 punch press has the following features:

1. 80 strokes per min.
2. Practically unlimited shut-die height to order.
3. Positive brake and counterbalance with equilabrator.
4. All herringbone gears.
5. Four-point engaging clutch.
6. Electrically-operated clutch control.
7. Simple conversion into power squaring shear.

Bed size of the 30-ton press is 15½x61¾ in.; ram size is 10x60 ¾ in., max shut die height to order, 24 in.; ratio of gearing, 6 to 1. The 5400-lb unit occupies floor space of 23x103 in.

Diamond Machine Tool Co, 3429 E Olympic Blvd, Los Angeles 23, Calif.

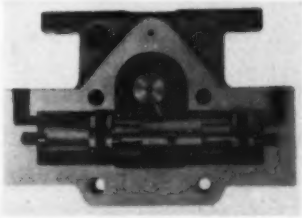


Inserted-Carbide End Mill

These inserted carbide small-dia end mills can be used for general purpose end milling, keyway slotting and profiling.

Known as Serratip end mills, they can be adjusted through inserted crosslock blade construction. The blade adjustment makes possible accurate maintenance of size, maximum use of carbide life, and maintenance of chip space. The crosslock construction is reported to provide rigid anchorage, positive blade positioning, and ease of adjustability.

Goddard and Goddard Co, 12282 Burt Road, Detroit 23, Mich.



Ledeen Power-Operated Valve For Air, Oil and Water

The POV power-operated valve, available in six sizes, is suitable for air, oil, and water operations, has the option of finger, cam, toe, or solenoid pilot controls.

The valve is essentially a four-way valve, but the rotation of the disk is accomplished by means of a piston moved by the operating fluid pressure of the main line, and controlled by small pilot valves. Applying pressure through the pilot on one end of the piston forces it to move ahead and rotate the valve disk to forward position. Applying pressure on the opposite end moves the piston back and rotates the disk to reverse position.

The pilot-operated valves can be used for the following purposes: remote control, where the operation must be distant from the valve; automatic operation, where the movement of some part of the mechanism must start the valve to create another movement; reciprocating service, where the cylinder must move continuously back and forth; safety, where failure of electric power or line pressure must reverse the valve.

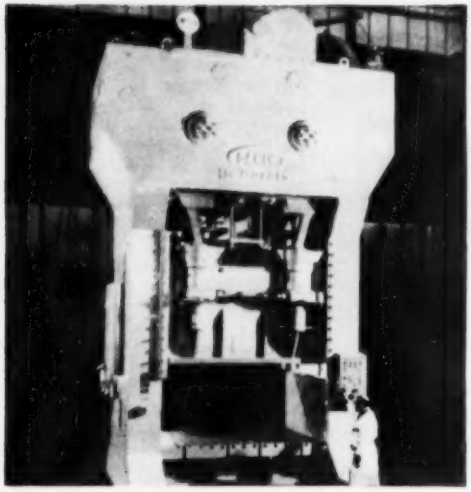
Ledeen Mfg Co, 1600 So San Pedro St, Los Angeles 15, Calif.

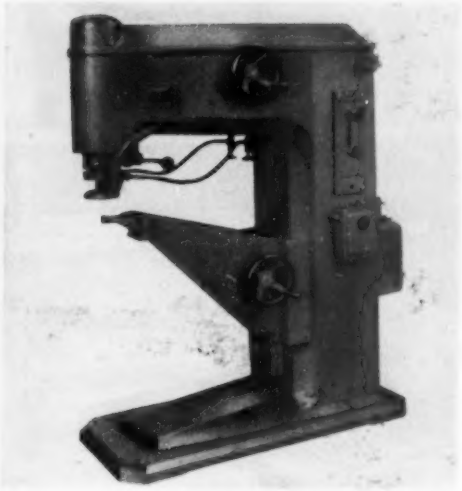
Automatic Air-Control Valve For Use on Dust Collectors

Known as the Ventomatic air control valve, this unit opens and closes automatically as the machine switch is turned on and off. This prevents the continual exhausting of warm air from the room when the machine is not operating, and effects important heating economies.

When the valve is open there is no obstruction in the air passage, eliminating the possibility of catching chips, dust, lint, or shaving threads. The valve is mechanically controlled by a solenoid, and is not affected by the air stream. Sizes are available to fit 3-, 4-, 5-, 6-, 7- and 8-in. ducts.

Kindt-Collins Co, 12653 Elmwood Ave, Cleveland 11, Ohio





Double-Action Press Has Inner, Outer Slide Motor Adjustments

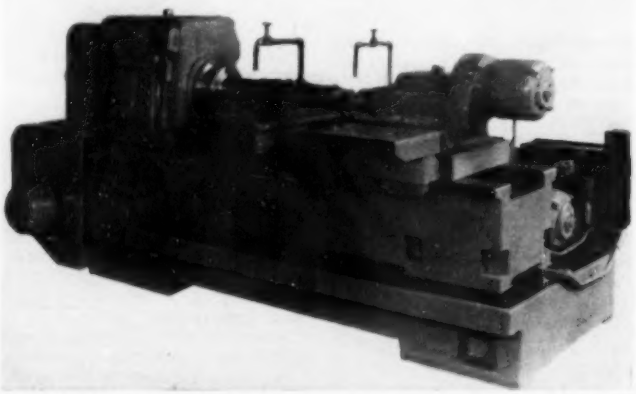
This 450-ton double-action, straight-side press is equipped with a Dynamic clutch which varies linear stroking speeds during the press cycle. Unit operates at the rate of 14 spm; slide speed during the effective draw is held to 60¼ fpm.

Motor adjustments to both inner and outer slides are provided. Outer slide, or blankholder, has a provision for a ¼-in. pinch adjustment which can be made at each corner to allow for uneven draws.

The press is equipped with a central lubrication system and a pressure safety switch for automatic indication of faulty oil lines.

Specially-designed bed meets prescribed limits of deflection, yet is built shallow enough for installation without a pit. This feature enables the unit to be moved from one position to another without major installation changes.

Danley Machine Specialties, Inc, 2100 South Laramie Ave, Chicago 50, Ill.



SHELL TURNING LATHE, designed for centering shell forging and cutting off open end, features heavy bed and headstock construction. Unit's spindle is driven through worm and worm-wheel gearing. Lathe is equipped with a self-contained hydraulic automatic feed cycle, and all components are readily accessible for service. Units for centering, rough turning, nose boring, finish turning, band grooving, base facing, and band turning are also available.—*Made by Williams Tool Corp, Brantford, Canada, Represented by Four States Machinery Co, 5304 W Chicago Ave, Chicago 51, Ill*

Horn Router Trims Parts Requiring Large Swing Clearance

The ECCo 434H horn router is particularly useful for many types of trim routing operations in non-ferrous metals requiring an unusually great swing clearance. It can be equipped with either 3-, 5-, or 7½-hp, 3600-rpm drive motor. Spindle speeds of either 10,000 or 20,000 rpm are easily and quickly obtained through a two-step drive pulley arrangement.

Adjustable 3-position positive depth stop has been built in for precision step-routing; min clearance between collet chuck and horn measures 10 in.

One standard pilot bracket and guide is furnished with the machine; others can be designed and supplied to special order. An air-operated coolant spray attachment is listed as optional and can be furnished at additional cost.

Ekstrom, Carlson & Co, Dept M-1, 1400 Railroad Ave, Rockford, Ill.

Expendable cap electrode fits into a semi-permanent adapter shank, which in turn fits any standard electrode holder of No. 3 Morse-taper size. For spot welding, the electrodes are made in six nose styles, including pointed, dome, flat, offset, truncated cone and radius face, and in three RWMA alloys. Adapter shanks are made in six lengths, ranging from 1¾ to 3 in. All electrode styles fit interchangeably into any of the shanks.

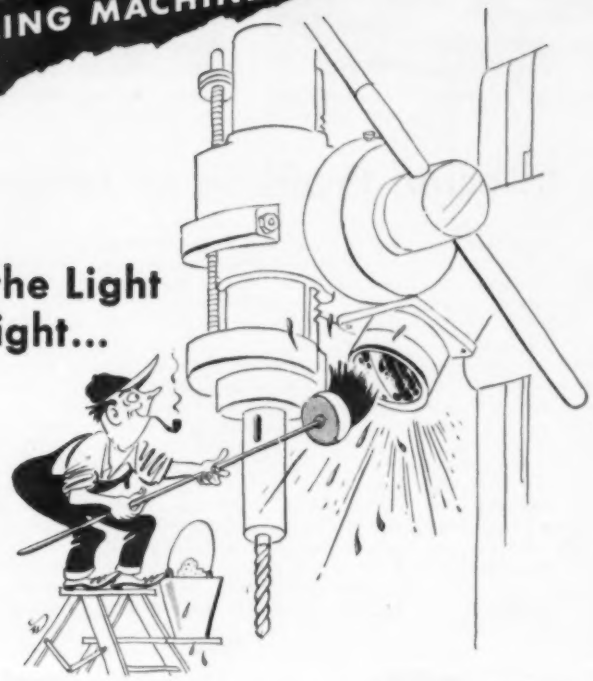
Weiger Weed & Co, Div of Fansteel Metallurgical Corp, 11644 Cloverdale Ave, Detroit, Mich.

Get the most out of your

LELAND-GIFFORD

DRILLING MACHINES

Keep the Light Bright...



The built-in light on the sliding head of every Leland-Gifford Drilling Machine is there for a purpose. It clearly illuminates the table and the work . . . helps you drill more holes with greater accuracy and safety. Frequent cleaning of the lamp lens with a soft cloth will insure maximum light and better performance from your Leland-Gifford Drilling Machines.

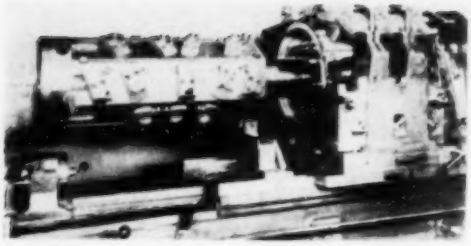
A small point? Yes . . . but important! Leland-Gifford Drilling Machines are built as trouble-free as master craftsmanship and long experience can make them . . . with totally enclosed motors, spline lubrication wipers, oil mist lubricated spindle bearings and many other features to insure lasting precision and safe, dependable operation. But neglect or abuse can impair the performance of even the finest equipment. With reasonable care and maintenance, your Leland-Gifford Drilling Machines will keep on producing accurate holes year after year. Remember, you are making a valuable contribution to the defense effort when you take the best possible care of your production equipment.

***SAVE TIME*— CONTACT THE OFFICE NEAREST YOU**

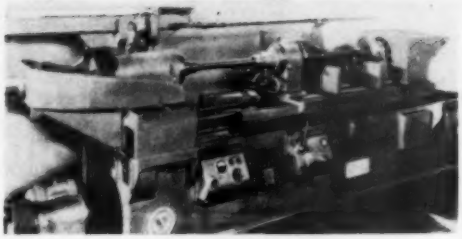
LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U.S.A.



Approximately 60 cutting tools are mounted in boring bar of Alfing Model HF/1150 for machining inside of jet compressor housings



Internal shaft profiling for jet engines with boring bar supported by a matrix in the shaft is done on Alfing Model HF 1/1000

Boring, Internal Profiling of Jet-Engine Parts

Two boring machines developed by Alfing Kessler Werke in Germany for the machining of jet-engine parts during World War II are now available in the US. They are the Alfing internal profiling machine for jet-engine shafts and rocket tubes and the Alfing machine for boring the inside of compressor housings.

Shafts which must be profile bored are first rough drilled and rough turned. A sizing bar is then placed in the shaft concentric with the OD and the space between is filled with a special matrix material that hardens in 5 to 10 sec. A special machine used for this operation can serve a number of internal profiling machines.

The shaft is then placed in the machine and the boring bar replaces the sizing bar in the matrix. This matrix serves as a continuous bearing for the boring bar until it is cut away, with the chips, as the hole is profiled. The tool is hydraulically controlled to follow the profile of a templet mounted on the machine.

Chips and matrix are forced out of the hole by coolant under pressure and separated so the matrix can be re-used. The shaft must be refilled with matrix around a sizing bar between successive roughing and finishing cuts.

This method is said to permit the design of jet-engine shafts and rocket tubes of any desired length and interior profile, to provide rigid support for carbide tools, and because of method of chip removal to allow a fine finish.

The other Alfing was developed for machining compressor housings designed in two pieces. The boring bar is of rigid design with a temporary support during loading. The tool slides are mechanically actuated and hydraulically controlled.

Both halves of the housing are clamped in the fixture by a series of self-locking, spring-loaded blocks. The carriage then advances the work over the boring bar. The boring bar is inserted in the outboard support bearing and the temporary support is retracted. Cylindrical, tapered, or combined bores, end faces, T-slots, and other grooves can be machined.

Boring-bar design permits considerable adjustment for design changes.

Morey Machinery Co, 410 Broome St, New York 13, N Y.

External Thread Roller Produces 19,440 pc/hr on Hollow Work

Model 300 Prutton Rollmaster rolls Class-3-fit threads in 12 in.—13 hollow set screws of SAE 1035 steel at the rate of 19,440 pc/hr. Machine performs comparably on either hollow or solid work in a wide variety of metals ranging from non-ferrous, through aluminum and magnesium, to hardened and stainless and other alloy steels.

A planetary-die principle radically reduces thread-rolling pressure by distributing it evenly over a full 30 in. of die length; distortion or crushing of hollow parts due to excessive pressure from shorter dies is eliminated.

Pieces are hopper-fed, and roll at close intervals around the circumference of the die. The large numbers of pieces in work at a time make possible slower die speeds, less wear, and a proportionate extension of die life.

D H Prutton Machinery Co, 3895 W 130th St, Cleveland, Ohio

BULLARD

MANUFACTURERS OF MACHINE TOOLS

Santiago Lake, California, and Scenic Road construction — Kaufman & Fabry Photo

The Invisible Background of Industrial Progress

Free America — "the country of roads" — High speed highways — State highways, some exclusively for pleasure car travel and Municipal roads — all contribute to the expansion of interstate, intercoastal, municipal and rural development. Equally important in our road systems are the many scenic roadways constructed for tourist and vacation travel. . . . Such projects are costly, but with more than fifty-two million passenger cars, trucks and busses, an increase of over 3.5 million in one year, they are essential to greater economic transportation, not only giving us a Freedom known only to the American Way of Life but also facilitating the movement of forces if needed for defense. . . .

In the Invisible Background of Industrial Progress, are the manufacturers of ★ *Modern Machine Tools* and all other equipment which make such projects possible. Tractors, grading equipment, hoists, sand mixers and hundreds of other pieces of construction machinery depend upon Machine Tools for their manufacture. Bullard is indeed proud of their part in the over-all picture of a country of Free People.

THE BULLARD COMPANY
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★ *For greater manufacturing economy*
REFER to next page

BULLARD MACHINE TOOLS
FOR GREATER MANUFACTURING ECONOMY

Operations on Tractor Front Wheel Knuckle Housing

The Mult-Au-Matic method has a basic time element for Manufacturing Economy. The time to produce a finished piece of work is equal to the time for the longest operation plus a few seconds for indexing. Mult-Au-Matics are considered as Key Units for repetitive machining of work where Accuracy and Fast Economical Production are the requirements.

Mult-Au-Matic work is not confined to any one field of industry but extends over a wide range of products made from varying types of materials. Today, under the defense program, these machines are in extensive use because of their high productive capacity, their consistent repetitive accuracy and their reliability with minimum "Down-Time".

Whether it is defense work or normal peace-time production the Mult-Au-Matics provide a low unit cost manufacturing method.

There is a Mult-Au-Matic for nearly any size job up to 34 inches in diameter.

For Manufacturing Economy use Mult-Au-Matics. Built in 8-, 12-, 16-, and 34-inch sizes with 4, 6, 8, 12, or 16 spindles according to the specific model.

BULLARD

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Want to take a slice off your finishing costs?

Here's the key to better product-finishing and lower costs: Have your nearby **O**sborn **B**rushing **A**nalyst study your present finishing operations. In hundreds of plants, he is applying the latest developments in brushing techniques to improve finishing quality and increase production.

For example, the stainless steel kitchen utensils shown above are being finished to satin smoothness with greater ease and uniformity . . . the result of techniques with Osborn Brushes and cut-and-color compound.

Your **OBA** will gladly give you assistance! Call him today or write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Dept. 810 Cleveland 14, Ohio.*

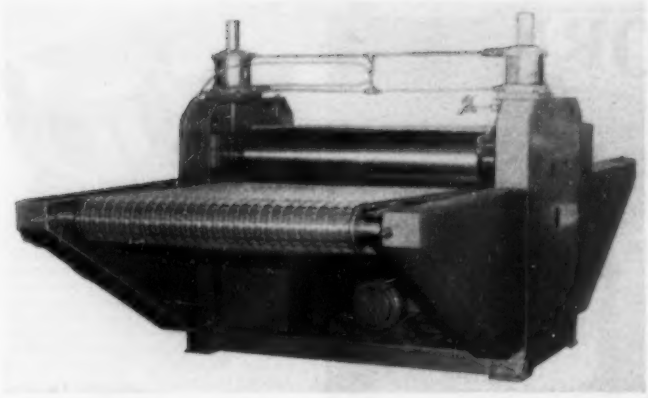
Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

TWO JOBS AT ONE TIME. A manufacturer of automotive sleeve bearings cleans steel-backed, babbitt-lined strips continuously in an automatic machine. Osborn Master® Wheel Brushes remove all dirt, rust and metal particles from the steel surface. At the same time, Osborn Monarch® Sections clean the babbitt side.

CENTERLESS BRUSHING. This centerless grinder does double duty in the production of nickel-moly steel pump rods. As a grinder, it rough-grinds, then finish-grinds the rod. Then wheel is replaced with an Osborn Fascut Brush for obtaining of smooth finish. Makes rods and pump packing last longer.

STRATEGISTS. Experienced Osborn research men and design engineers help your engineers develop basic brushing methods and brushing machines to solve cleaning and finishing problems. Their services are yours as a part of the comprehensive service offered by your **O**sborn **B**rushing **A**nalyst. Call your nearby **OBA.**



Die-Lubricant Roller Coater Equipped With Automatic Infeed

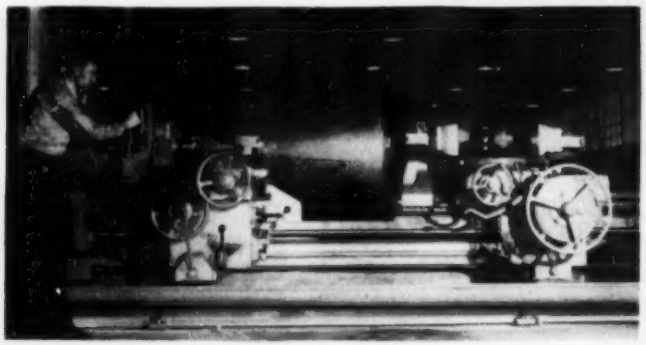
Roller Coater is equipped with three sets of rolls and with automatic infeed and off-bearing conveyors. Rubber nip rolls convey the work from an infeed conveyor through a set of brush rolls for cleaning, and then through a set of hardened steel coating rolls. Doctor rolls, controlled by a calibrated handwheel with micrometer adjustment, gage the coating thickness.

Pressure on the coating rolls is applied by two 6-in.-dia air cylinders which develop 28 times the line pressure. Pressures from 0 to 160 lb can be achieved. The air-cylinder circuit is equipped with regulator, gage, oiler, and filter.

The high pressure behind the coating rolls serves two functions. It provides a deburring action on the metal work, and at the same time supplies the pressure necessary to press the compound into the pores of the metal. This increases die life, decreases scrap, and produces a thin, even coating.

The coating rolls have adjustment for stock thickness from 30-gage to ½ in. and will take widths from 1 to 112 in. Speed is variable from 30 to 90 fpm. A circulating pump supplies compound to the coating rolls. Water or other solvents can be substituted in the pump for cleaning purposes. The machine applies compound to one or both sides.

Union Tool Corp, Warsaw, Ind.



Gap Lathe Speeds Cone Cutting With Single Set-up for Both Ends

This gap lathe, designed to machine large jet engine exhaust cones operates with a single setup to machine flanges at both ends. Cutting tools turn and form flanges to exact dimensions in one pass, an advantage over vertical turret lathes requiring two setups and a tool change.

One man can load and operate the machine, which is equipped with arbor and trunnion, and an electric hoist and swinging crane.

Sturdy construction insures high precision work; base is a one-piece welded steel foundation. V-bedways are induction-hardened to specific depth and hardness to minimize wear. Drive is from a 50-hp electric, two-speed motor with push-button control. Hydraulic brake brings spindle to a fast, smooth stop, regardless of speed.

Warner & Swasey Co, 5700 Carnegie Ave, Cleveland 3, Ohio

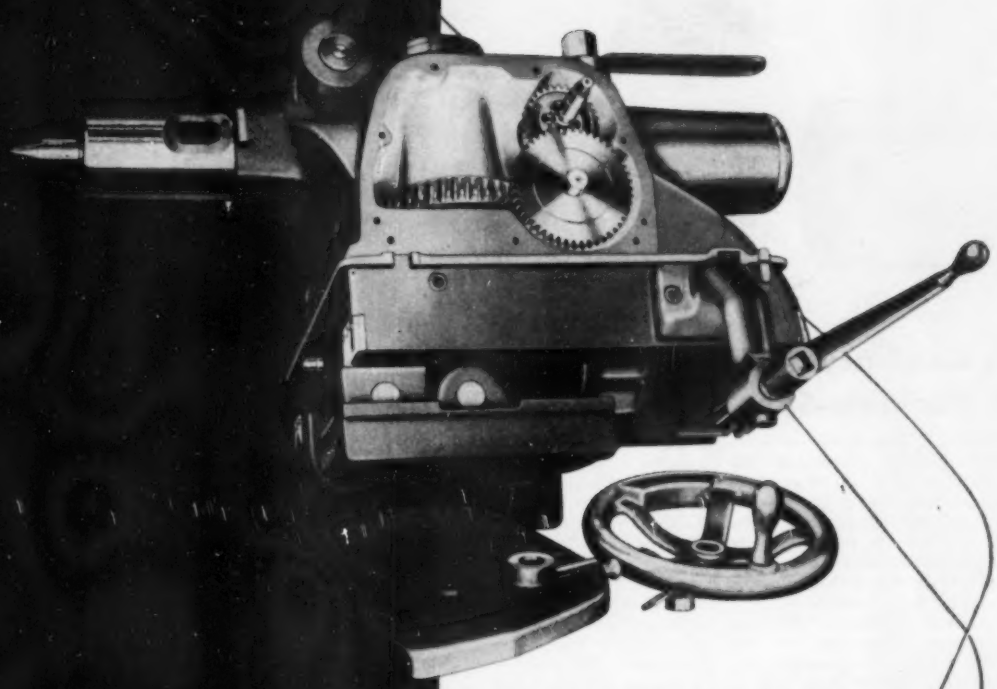
Wide-tolerance Gaging Head Has Variety of Applications

Gaging head known as the Plunjet has been developed for use in conjunction with Precisionaire and other makes of air gages for wide tolerance work. Head is calibrated by a feeler gage having min and max limit elements.

Normal and reverse units are available in three standard ranges: 0.040, 0.020, and 0.010; Plunjets for special ranges and closer tolerances can be supplied on order.

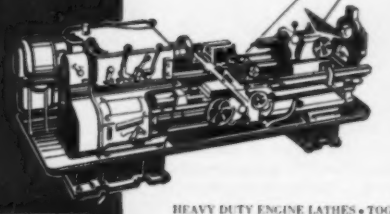
The device is particularly useful for measuring irregular parts, and flatness; for general machine shop work, such as height gages, squareness, and depth checks; in gaging wide tolerances on inside dias exceeding 3 in., and on lathes and other metal-removing equipment to ascertain when the part is reaching proper size.

Sheffield Corp, Dayton 1, Ohio



AXELSON'S TAILSTOCK

The Axelson Tailstock, originally patented by Axelson, is a 2-speed unit with a high-low gear ratio, providing the operator with a time saving operation in drilling, and enough power to use the largest drills fitting its spindle, without the necessity of using additional leverage — unlike the conventional tailstock. • The hand wheel, situated directly in front of the operator, permits a longer tailstock spindle travel at one setting than others with the single screw and hand wheel positioned at the rear end of the tailstock body. • The hardened and ground alloy steel spindle is lapped into the bore of the body, leaving only that clearance needed for a sliding fit. • One of the most needed features is provided in the Axelson tailstock spindle — a drill tang slot for positive holding of the drill. • This tailstock is held to the bed by a cam locking clamp, permitting an overhang of several inches. • On Axelson 20", 25" and 32" lathes a stationary ratchet type rack is cast integral with the bed center. Bracing of the tailstock is accomplished by dropping a pawl into the ratchet making slippage of the body impossible. • Accurate hand scraping and fitting is given the Axelson tailstock to bring it into proper alignment with the headstock to insure straight and accurate machining regardless of its position on the bed. • So it is throughout all Axelson lathes. Quality built, they deliver dependable precision work under the most difficult operating conditions. • **Send for Bulletin 5001.**



AXELSON Lathes

HEAVY DUTY ENGINE LATHES • TOOL ROOM LATHES • GAP BED LATHES

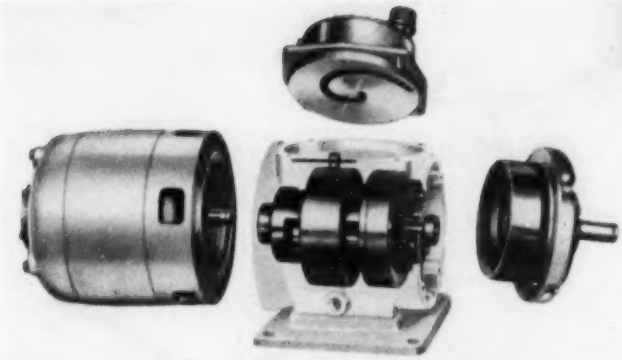
AXELSON MANUFACTURING COMPANY, 6160 S. BOYLE AVE., LOS ANGELES 58, CALIF.

Authorized Distributors in All Principal Industrial Centers

OUR 61st YEAR

Chosen first to last

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY



Combination magnetic base holder for magnifier and dial indicators mounts to curves or flat surfaces instantly. Called Miti-Mite No. 120, it includes: a magnetic base holder, a double-lens 4-power magnifier, and complete accessories for holding most small dial indicators. The accessories include one 7/32 and one 5/16-in. diameter post, a 4½-in. extension rod, and an adapter to take the magnifier as well as 5/32-in. stud indicators. These accessories permit using Starrett No. 196, Lastword, Federal, Ideal, and many other indicators. Price is $12 complete.

Enco Mfg Co, 4524 W Fullerton Ave, Chicago 39, Ill.

No Auxiliary Spring Loading On Variable-Speed Transmission

The Model-18 light-power variable-speed transmission operates at 1800-rpm input without use of auxiliary spring loading, thus it provides extra-safe overload protection. In the event of a jam in the driven machine, the transmission can be stalled for a long period without damage to machine or transmission.

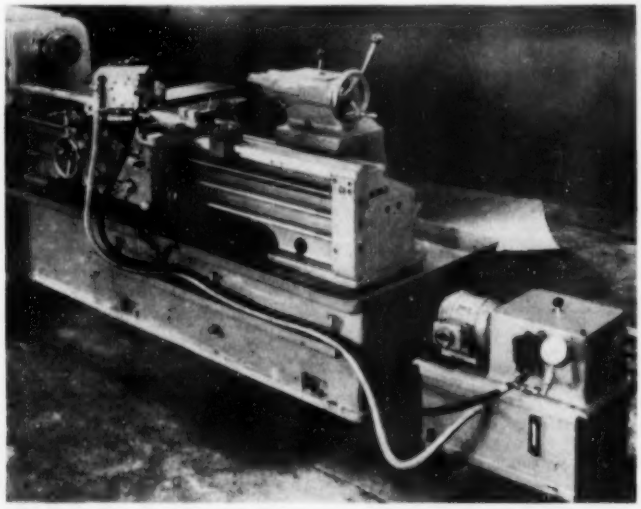
A compound planetary-gear system is used, except that the non-rotating member is a traction ring and engages two or more tapered rollers at varying diameters. The ring is moved lengthwise of the transmission to change the speed. The rollers are supported in a carrier and are inclined at an angle equal to their taper so that their outer edge is maintained parallel to the central axis. The required traction pressure between rollers and ring is obtained through the centrifugal force of the rollers themselves, which press outwardly against the ring under centrifugal force.

Graham Transmissions, Inc, 3754 N Holton St, Milwaukee 12, Wis.

Pushbutton Control on Electric Chain Hoist

This model is available in capacities from 250 to 2,000 lb plug-in operation from any single-phase lighting circuit, 220 or 440 v power line. Regardless of voltage used, no more than 110 v passes through control station. Features include: flexible welded steel load chain; upper and lower safety limits; helical gears; positive chain guide; full enclosed mechanism; and permanent lubrication.

Chisholm-Moore Hoist Corp, Tonawanda, NY



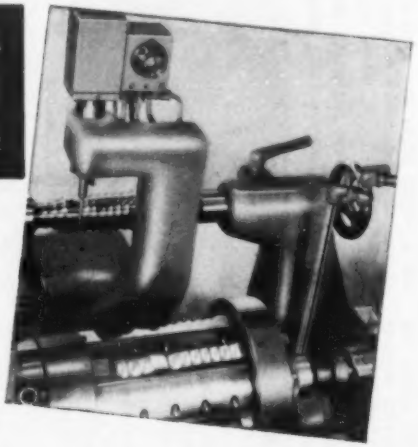
MULTICOP HYDRAULIC COPYING ATTACHMENT, a German import, can be used on Weisser-Heilbronn lathes or any other make if dimensions are given. The attachment, master, and tracer are all on the front of the machine. This is claimed to give the tracer greater accuracy as well as more versatility. It is said to be good for both short- and long-run work. — *Guthery Machine Tool Corp, 130 West 42nd St, New York 36, NY*

A fastening device for attaching plastic push buttons to switch arms is equipped with spring-action prongs which engage the inner surface of the button, locking it securely in place. Advantages of the clip include positive resistance to the loosening effect of vibration and adaptability to a wide range of sizes of buttons and arms. Device will fit any size or thickness of arm, providing the prepared hole in the arm is correctly placed.

Shakeproof Inc, St Charles Road, Elgin, Ill.

SAVED! 1 HOUR AND 55 MINUTES PER PIECE IN PRODUCTION TIME—COSTS

SIDNEY FLUID TRACER TIME ONLY 10 MINUTES



From round or flat templates or regular lathe work without limiting range.

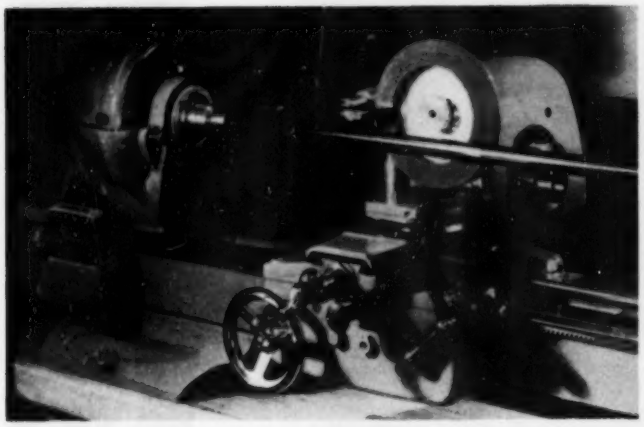
RUGGED... Built to take continuous intermittent cutting with amazing savings on pieces as illustrated.

Get the "inside story"—write direct or contact nearest SIDNEY representative.

SIDNEY HEAVY-DUTY LATHES

SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO

BUILDERS OF PRECISION MACHINERY SINCE 1904



Taber Abrasion Tester Checks Wear Resistance of Finishes

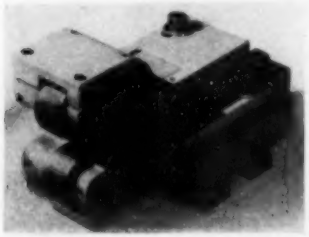
Abrasion testing machine is used for rating the wear resistance of protective finishes, that is, black oxidized or electroplated coatings, extruded plastic and enamel applied to aircraft, ordnance and metal tubing, and other cylindrical parts.

The illustration shows a 34-in. rifle barrel being tested to determine the amount of wear from handling it will withstand before the blue oxide finish is worn thin, resulting in corrosion. The barrel is placed between two driving centers with the test surface in contact with the abrading head. This head can be adjusted lengthwise to any position within its range. Pressure of the abradant against the test surface is applied by a floating deadweight load system, which compensates for minor inaccuracies of the test part.

Known as the Model No. W-3981, the tester is adjustable to take cylindrical specimens from ½ to 6 in. in diameter and 8 to 36 in. in length. The width of the wear track can vary from 1 to ½ in. in width. The abrasion resistance is reported as the number of wear cycles the surface will withstand before penetration of the finish permits corrosion. One complete revolution of the abradant wheel is regarded as one wear cycle. The end point for corrosion resistance is determined with an indicator solution, or by comparing a visual end point with a standard. Wear cycles are indicated by an electric counter at the left.

A motor-driven refacing wheel for the abradant is located at the left of the driving head. It is moved across the face of the abradant wheel by means of a hand feed screw.

Taber Instrument Corp, 111-AM Goundry St, North Tonawanda, N. Y.



Reed Thread-Rolling Attachment For Automatic Screw Machines

The Series G2A thread-rolling attachment is used on automatic screw machines and turret lathes. It permits threading close to shoulders, and since rolling can be done on the collet end of the part, behind shoulders, a secondary operation is often eliminated.

The attachment is geared and built in three standard sizes—½, ¾, and 1 in. Other special sizes are available on larger threads.

A precision matching device permits the rolls to be accurately matched by rotating one roll in relation to the other in infinite increments of circular measurements.

The head pivots in the adapter allowing the rolls to automatically position themselves in relation to the center line of the spindle on contact with work. Clearance between the head shank and the adapter allows the head to float sidewise. This eases the side pressure on the rolls as they are fed into the work. Upon completion of rolling, the head returns to the centralized axial position in the adapter.

Class 2A and 3 American Standard and other similar threads may be rolled with this equipment. Taper rolls for pipe threads are interchangeable with straight rolls within the capacity of the head.

Reed Rolled Thread Die Co, 237 Chandler St, Worcester 2, Mass.

Hand Dump Truck

This truck was originally designed to catch turnings from screw machines, but it can also be used for many other purposes.

It is constructed of heavy sheet steel, reinforced with a flange along the top edge. A stout 5-in.-round-rod iron handle is welded to body. Top measures 25¾x45 in., bottom 25¾x27 in. Depth is 17½ in. Overall height is 23 in., but it can be furnished higher or lower on special order. It is equipped with two 8-in. steel wheels and two 4-in. metal swivels. Weight is approximately 125 lb, and capacity about ½ cu yd.

Palmer-Shile Co, 16019 Fullerton, Detroit 27, Mich.

Rust inhibitor is said to effectively prevent rust for six months to over a year. For comparative purposes, it withstood 72 hours in the standard salt spray test. It is offered in handy 12-oz spray containers or bulk quantities. It is an animal fat base product that actually has some lubrication qualities. When desired, it can be removed with kerosene or gasoline. Other features claimed: it can be applied to a wet, damp surface and still be effective—panels coated while damp survive humidity tests longer; it will withstand normal handling—dries to a tacky finish; and is non-toxic and non-inflammable.

Crown Industrial Products Co, Park and Borden Ave, Sycamore, Ill.

Hjalmar Ellstrom

INVENTOR OF THE GAGE BLOCK

The achievement of perfection . . . the mastery of any art, craft, or science . . . is a rare human accomplishment. A discovery or an invention that contributes to the total welfare of all mankind is rarely the heritage left by a single man. So rare is it, indeed, that in such infrequent instances, the true facts surrounding its origin are often distorted, or even lost in the conflicting claims of others who would seek the worldly gains to be derived from undeserved fame.

So it was with the Gage Block. For, actually, this basic standard of measurement used the world around was originally conceived and invented solely and entirely by . . . Hjalmar Ellstrom. Here, briefly, is the story of his accomplishment:

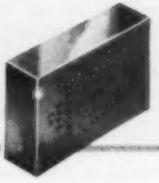
During the early 1890's, Hjalmar Ellstrom was employed by the government rifle factory at Eskilstuna, Sweden. He was a master craftsman . . . a man of infinite patience who took great pride in his work. He was a man of vision, too, who recognized the limitations imposed upon industry by the lack of sufficiently accurate measuring devices. So, with a then unheard of standard of precision as his ultimate goal, he alone developed and perfected his checking instruments and techniques . . . then alone he created the world's first gage block accurate to the infinitesimal millionth part of an inch.

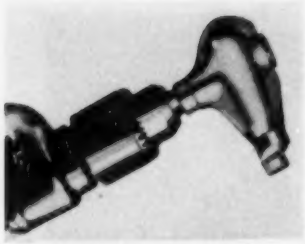
Today, though his achievement has been copied and imitated by others, his personal unqualified devotion to accuracy is the exclusive heritage of Ellstrom . . . *now measuring in millionths for three generations.*

ELLSTROM STANDARDS DIVISION

DEARBORN GAGE CO. • 22035 BEECH ST. • DEARBORN, MICH.

Originators of Chromium Plated Gage Blocks



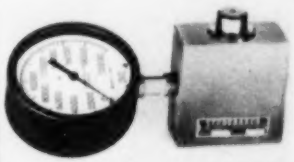


Mall Nibbler Attachment for Electric Power Drills

Nibbler attachment is designed for cutting all kinds of thin metal such as sheet steel, brass, copper, or fiber up to 19 gage. Width of cut is ⅛ in., and easily handles close detailed work.

The attachment uses a high-speed punch cutter. It operates with any ¼-in.-capacity standard or heavy-duty electric drill, at speeds from 800 to 3500 rpm.

Mall Tool Co, 7740 S Chicago Ave, Chicago 19, Ill.



Ram Pressure Accurately Tested

Tester will directly and accurately indicate the actual ram pressure on press work. It can be used on all types of presses, in either a vertical or horizontal position.

It is a self-contained hydraulic unit accurately calibrated. It is made in three sizes, 0 to 10,000 lb; 0 to 50,000 lb; 0 to 100,000 lb. Special pressures over 100,000 lb available on special order.

Studebaker Machinery Co, 1176 S 9th Ave, Maywood, Ill.

Reliance Low-Inertia DC Motor for Rapid-Reversing Machine Tools

This motor makes use of two electronic circuits to briefly impose several times normal voltage on both armature and field. Controlled within predetermined current limits, these forcing circuits make it possible, while maintaining maximum torque, to reverse the motor more rapidly than has heretofore been done. Moreover, the consistency of point of reversal is maintained because of a minimum of overtravel.

The motor with its associated generator and electronic controls will be available in sizes from 1 to 500 hp. They are force-ventilated with air supplied by an integrally mounted blower.

A number of design improvements increases commutating ability and the high torque it develops. One is the high flux design utilized. This is based upon greater use of iron in the motor, larger air gap, thicker frames, and improved poles. Other refinements include full-length, laminated interpoles; non-magnetic interpole bolts and shims; and non-magnetic banding wire for the armature.

Use of low-voltage fields on both the motor and generator of the drive facilitates the forcing effect of the electronic circuits. The generator has one field with normal voltage of 25 v. The motor uses two fields—one supplied from a constant potential exciter at 115 v, the second supplied by an electronic exciter, the voltage of which is determined by the motor size.

Developed especially for reversing service, this electronically-controlled reversing drive provides high accelerating torque that responds instantly to the forcing circuits of the electronic controls. IR drop compensation and generator voltage regulation combine to maintain motor speed constant under wide changes in load. The motor-field circuits regulate field current to eliminate speed drifts resulting from motor-field heating.

The Reliance Electric & Engineering Co, 1088 Ivanhoe Road, Cleveland 10, Ohio.

Humidity testing cabinet with a 27-cu-ft working area will supply relative humidity between 20 and 95% in the temp range of 35 to 185 F. Fast, accurate regulation is assured through the use of a hermetically-sealed refrigeration unit and an electric heating system, which quickly lower or raise interior temp to the precise degree required. Condensation is eliminated through the use of a high-capacity condensing system.

Murphy & Miller, 1326 S Michigan Ave, Chicago, Ill.

Roller chain uses oil-impregnated sintered-metal bushings. The chain is said to have a marked increase in service life on application where normal lubrication is not available.

Whitney Chain Co, Hartford, Conn.

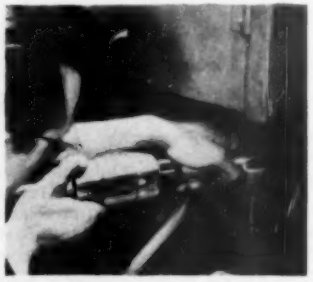
Plastic Inspection Tray Set

Inspection set consists of one pick-up tray formed of 0.093 in. Boltaron sheeting, and is 11x9¾x1¼-in. deep, and three insert trays of 0.062 Boltaron, each 4½x4¼x1-in. deep.

The sets will be available in a variety of standard colors for use in plants producing precision parts. The inspector is able to spot check machined parts for critical dimensions and segregate rejects into one of the insert trays.

Boltaron, a copolymer plastic, is light-weight, non-chipping, non-contaminating, and resists oils, alkalies and solvents. The tray set costs less than stainless steel.

Durable Formed Products, Inc, 329 Canal St, New York, NY



Small Pneumatic Angle-Head Drill For Close-Quarter Work

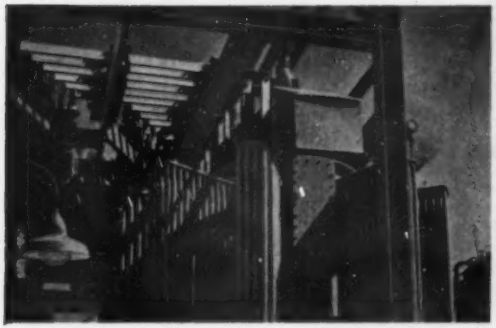
The small, compact angle head on this pneumatic drill permits work in close quarters. The head can be swiveled to any position relative to the throttle by simply loosening a single nut.

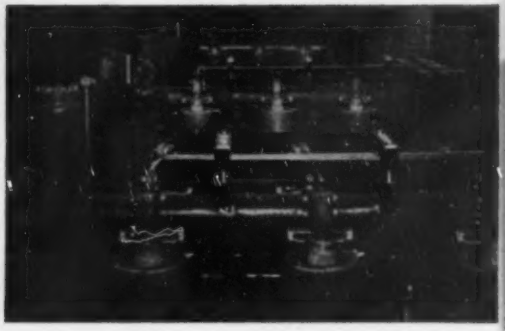
A built-in air regulator allows variable-speed ranges on the air motor, while a built-in automatic oiler eliminates the need for line oiling.

The model is available with either a button or lever throttle and is furnished with a ½-in. Jacobs geared chuck, key, lubricant, hydraulic fitting, and rubber air-hose assembly.

Mall Tool Co, 7740 S Chicago Ave, Chicago 19, Ill.

It takes a Lot of Copper to make a Lot of Chemicals!





These photographs show a lot of copper bus bar in a new plant of a great chemical company, whose name and location cannot be disclosed. The copper carries heavy currents to electro-chemical equipment for the production of valuable products used in national defense and in industry. Revere furnished 325,000 pounds of bus bar for this service, the bar going into substations, rectifier stations, and cell houses. In addition, at the time of installation the Revere Technical Advisory Service collaborated with the customer in working out some difficult details in the design of switches. If you need electrical conductors, remember that copper has the highest electrical conductivity of all the commercial metals, that Revere makes bus bar, and that the Revere Technical Advisory Service is always ready to work with you on any problem concerning copper and its alloys or aluminum alloys. Call the nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

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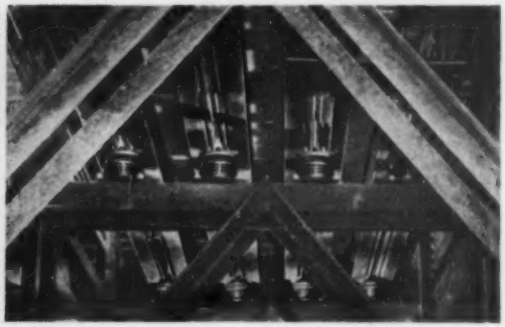
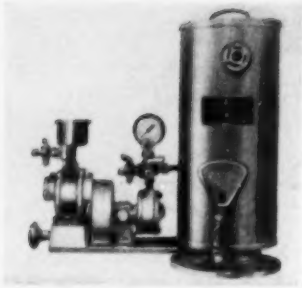
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY





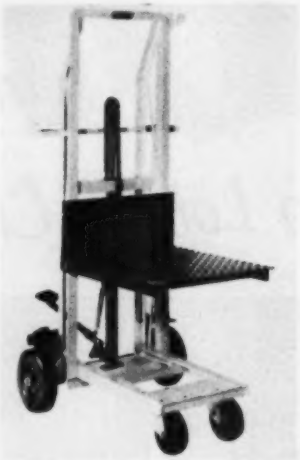
Arvins Paint & Lacquer Heater Has Easily-Cleaned Paint Tubes

The Arvins Viscolator is designed to reduce the viscosity of lacquer, synthetic enamels, and other similar materials. Reduced viscosities make it possible to spray paints with savings on thinners, and with a lower air-atomizing pressure.

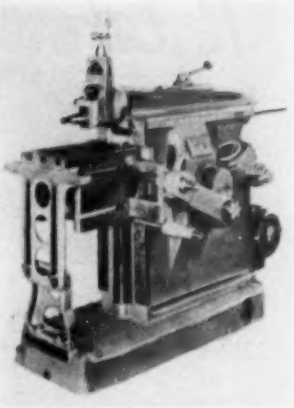
The unit has vertical, straight paint-carrying tubes imbedded in solid aluminum used as a heat-transfer medium. No water or any other addition is required. The tubes are easily cleaned without having to replace them.

The viscolators are heated by electricity, steam, or a combination of both. They are available in circulating and non-circulating types in capacities of 12 to 250 gph. The circulating model may be operated directly from the material container and does not require a pressure tank. The pump is motivated either by an air or electric motor.

Arvins Viscolator Corp, 183 DeKalb Ave, Brooklyn, NY



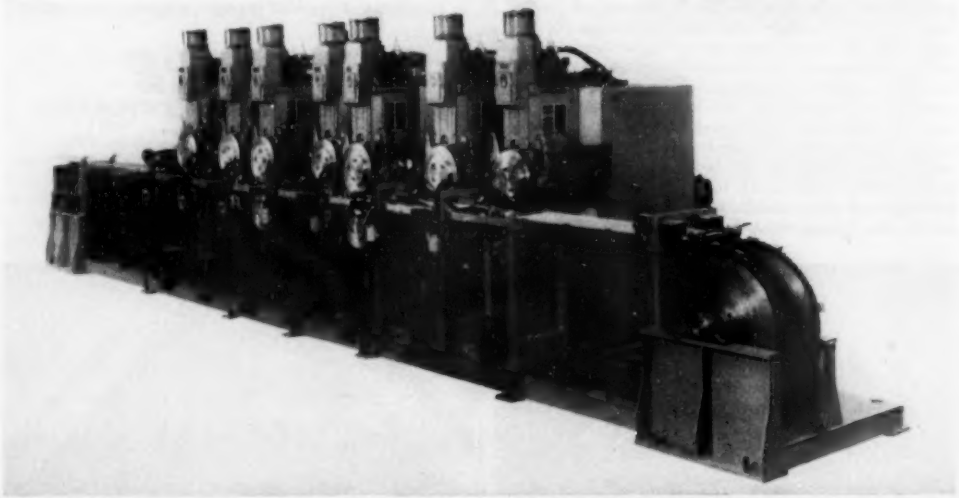
HYDRAULIC PLATFORM LIFT, known as Big Joe Model 14S, has load capacity of 750 lb. Lifting height is 55½ in., and rear wheels are 10-in.-dia solid rubber. Other features are: positive locking safety breaks, dual ball-bearing 6-in. swivel casters, safety hand grips, hydraulic load raising. Price $256.50 FOB Chicago. *Big Joe Mfg Co, 184 N Franklin St, Chicago 6, Ill.*



Hercules V-Ram Shapers With Automatic Pressure Lubrication

Hercules shapers have a V-ram and a 16-in. stroke, and are equally suited to production and toolroom work. Features include: automatic pressure lubrication to gearbox, bullgear main bearing, rocker-arm slide block, and ram guide ways; V-belt motor drive; a cutting-speed indicator for six speeds of 26 to 152 strokes per min; and 7-in. swivel vise with jaw opening of 8 in. Surface of worktable is 15½x10½ in.

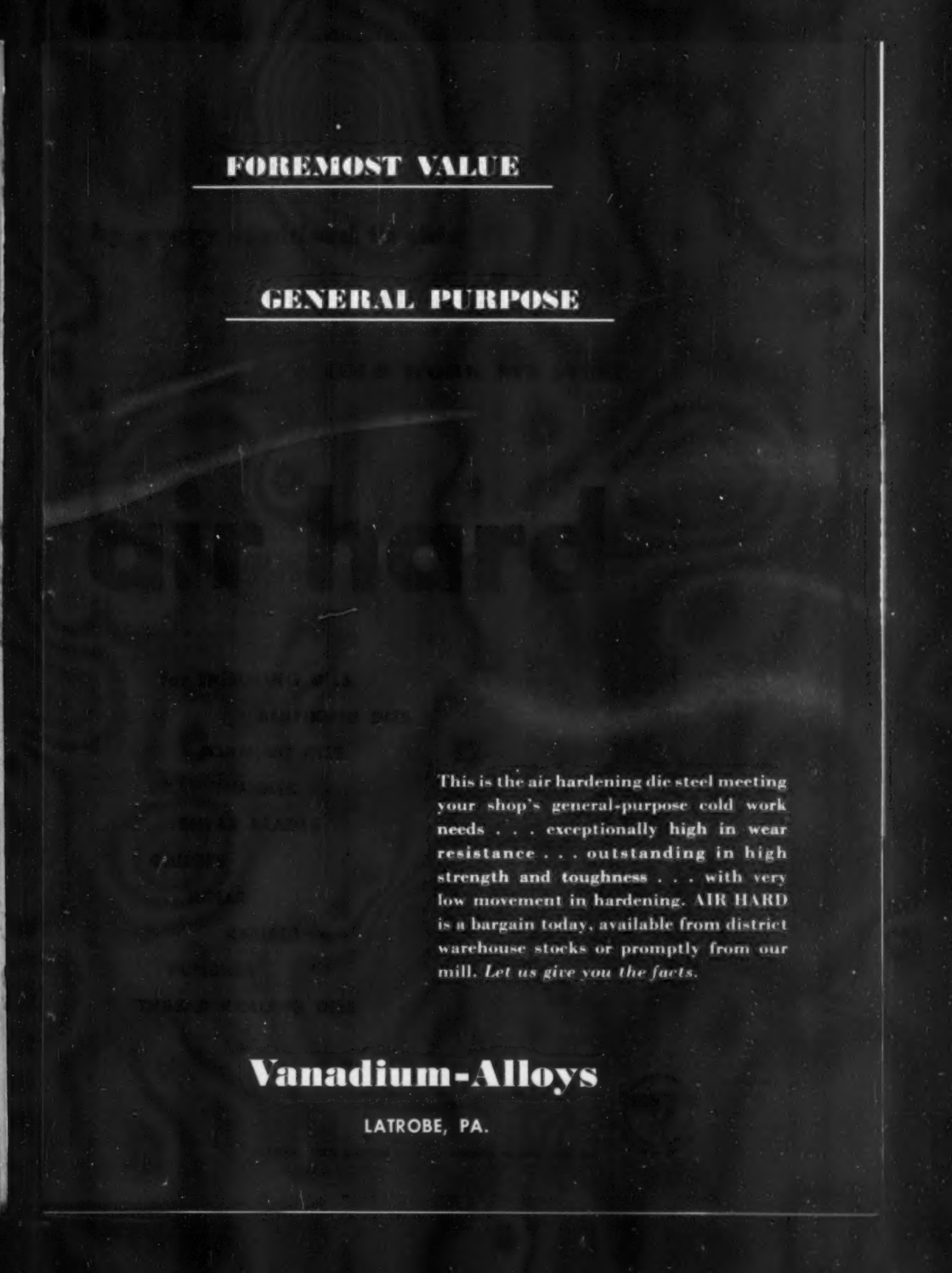
Parker Machine Co, Inc, 158 Pioneer St, Brooklyn 31, NY



MULTIPLE-SEAM RESISTANCE WELDER makes the liner for the cold wall of the low-temp refrigeration compartment in a refrigerator by welding aluminum to aluminum. As the 0.032 gage, 13x60-in. plate travels through, six formed aluminum channels, ⅜ in. wide x 60 in. long with ½-in. legs are welded to the plate in a simultaneous operation. A multiple high-speed wheel dressing unit removes the aluminum picked up on the copper welding wheels. The entire welder is 32 ft long. One operator and one assistant can load and unload at each end. Approximate rate of operation is 120 panels per hour.—*The Taylor Winfield Corp, Warren, Ohio*

FOREMOST VALUE

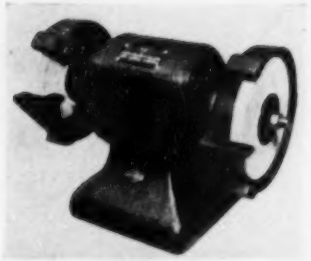
GENERAL PURPOSE



This is the air hardening die steel meeting your shop's general-purpose cold work needs . . . exceptionally high in wear resistance . . . outstanding in high strength and toughness . . . with very low movement in hardening. AIR HARD is a bargain today, available from district warehouse stocks or promptly from our mill. *Let us give you the facts.*

Vanadium-Alloys

LATROBE, PA.



Stanley ¼-hp Bench Grinder

Style 246 bench grinder is claimed to overcome difficulties in handling large, oddly shaped parts and castings on small grinders. The flat surface of the grinder housing permits the operator to maneuver castings or parts so that both sides of each wheel may be used.

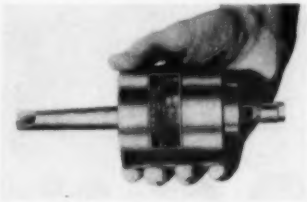
The ¼-hp motor is a ball-bearing constant-speed induction type. The grinder is equipped with adjustable tool rests and safety wheel guards which are wide enough to permit use of wider wheel brushes. Guards are drilled for mounting of Stanley eyeshields. A toggle-switch is enclosed in a model case located on the base of the grinder.

The model comes furnished with three-wire rubber-covered cord with ground connections; rubber feet; 6 x ⅝ in. grinding wheels (one coarse and one fine); wheel guards, and tool rests. Motor operates at 2850 rpm full load, 3450 rpm no load, ac only, 50-60 cycles, single phase: 110-115 volts, 125 volts, 150 volts, 220-230 volts.

Stanley Electric Tools, New Britain, Conn.

Gas-welding flux for 2S and 43S aluminum is equally effective either as a paste or a powder. It is also claimed to be effective in welding stainless steel. Other features claimed by the manufacturer include: does not break down even at temp required for welding stainless; spreads thinly and evenly ahead of flame; floats any remaining impurities smoothly out of puddle, leaving bright, smooth, flux-protected puddle at all times; and does not flake off and leave surface unprotected, causing rough, bubbly weld. It is known as the All-State No. 35 Flux.

All-State Welding Alloys Co, Inc, White Plains, NY

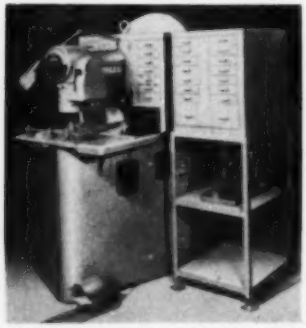


Cone-Drive Tapping Chuck

This chuck is small, compact, and light in weight. It has an oil-resistant Celeron cone and interchangeable shanks.

The main spindle is supported at top and bottom by needle bearings. It is available with collet chuck or Jacobs Rubber-Flex tap chuck. Sizes and prices are as follows: 0 to No. 10 taps, $55; ⅛ to ¼ in. taps, $65; No. 10 to ½ in. taps, $90.

Errington Mechanical Laboratory, Inc, Staten Island 4, NY



SHEET-METAL FABRICATOR is available with either of two combination materials-handling accessories: (1) worktables and tool racks, (2) auxiliary cabinet and tool rack. The combination worktables and tool racks are placed on each side of the fabricator and are the same height as the bed table. The combination is adjustable front to back and is equipped with adjustable feet for leveling. The auxiliary cabinet and tool rack provides additional drawers to hold punch assemblies and dies and two shelves for storing other tooling. The fabricator punches and notches up to ¼-in.-thick mild steel from blueprints or operation sheets with no templets required. — *Wales-Strippit Corp, North Tonawanda, NY*

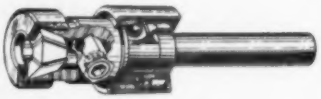
Curtis Air Compressor Has Four-Section Intercooler

Compressor has a 7½x5-in. low pressure, and a 4 3/15x5-in. high-pressure cylinder. Piston displacements range from 78 to 92 cfm at pressures from 100 to 175 lb with 15-hp motor, and 108 cfm at 100 to 125 lb with 20-hp motor.

Cushioned annular disk valves and an effective four-section intercooler increases efficiency. Low-pressure piston is aluminum, high-pressure piston is cast iron.

The bare compressor is designated Model No. 98. It is also available in 15- and 20-hp. base-mounted units with or without motor, with or without separate air tank, and with constant running, automatic start and stop, or dual controls.

Curtis Pneumatic Machinery Div, St Louis 20, Mo.



Self-Releasing Tap Holder

Holder will work either right- or left-hand threading and depends upon steel balls for its releasing action. Action is claimed to be so smooth that threading may stop and start at any point without difficulty.

On heavier machines, power feed may be used, providing feed does not exceed threading rate of tool. The ball action will engage and release to accommodate the feed rate.

Only two operations are needed for a tap change. Front Jacobs rubberflex collet holds alignment true and is easily tightened with an open-end wrench. The back jaw takes care of torque and holds tap in positive position with the turn of a hex key. ⅝x¾ shanks available at present. Collet fits No. 10 to ½-in. taps.

Roddick Tool Co, Anaheim, Calif.

Perfect Alignment, Exact Hole Size, Good Surface Finish... All in One Honing Operation

A single hole, or two in tandem — it makes no difference to Sunnen Honing Machines. This piston is a good example of the versatility of these precision machines on various production jobs.

Problem: To hold close tolerances with perfect alignment between piston pin holes.

MATERIAL: Cast Iron — HOLE DIAMETER: .4375"
HOLE LENGTH: ¾" — TANDEM LENGTH: 1¼"
TOLERANCE: .0002" — STOCK REMOVAL: .002"
SURFACE FINISH: 10 micro-inches

Solution: Sunnen Model MBB-1290 Honing Machine with "L" type Honing Unit. Machine was installed and in operation within 6 weeks after original inquiry.

Results: Perfect alignment, with no bind as piston pin enters second hole—exact size to give required oil clearance—smooth finish for long wearing, virtually 100% bearing surface. All this at a production rate of a piston every minute.

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-492

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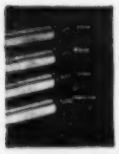

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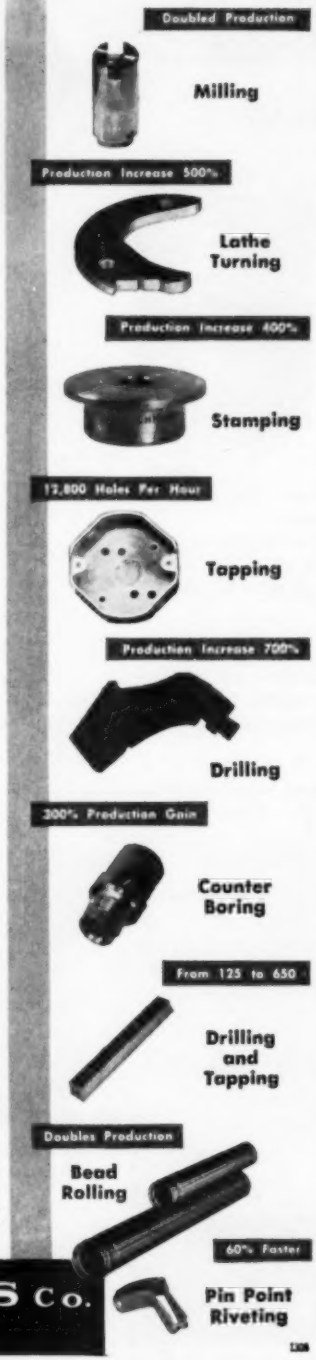


The Bellows Co.
AKRON 9, OHIO

ROUND TABLE Discussion

DOUBLE TROUBLE

What is the best way to bring about cooperation between double shifts? Does a night crew tend to be more careless with machines, more thoughtless about leaving things in good shape for the next shift? Some opinions . . .

IN "DOUBLE TROUBLE," Ed is consulted on one of the most controversial problems met in shop operation. I am surprised that he did not get out his copy of RUNNING A MACHINE SHOP (McGraw-Hill Book Co. Inc, 1941) and read to Al what his old friends, Colvin and Stanley, had to say about "Extra Shifts," in 43 pertinent lines on pages 312 and 313.

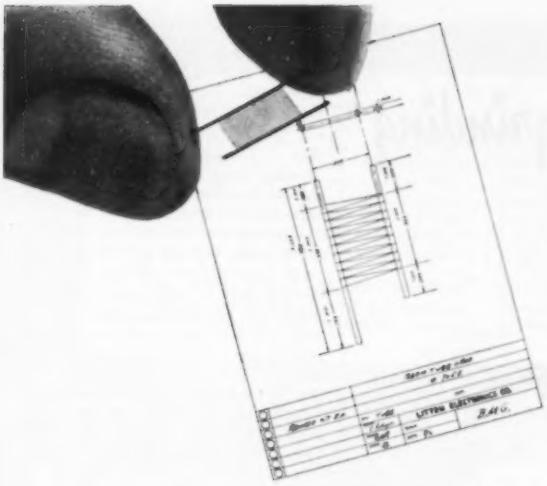
After not quite, but almost, as many years of tangling with that unpleasant problem as Fred Colvin has spent, I am very sure that the lap-over they recommend is the best insurance against trouble. But I go much further with the lap-over and make it a full half-shift, so that the foremen change in the middle of the working shifts. Of course, with only two shifts, that makes one foreman split his day and show up at the shop twice in 24 hours—but C & S intimate how that can be taken care of.

And both the workman and foreman shift-hours rotate every week, so there is no such thing as permanent shift.

All the force is at work when the foremen change, and for a half-shift afterward; when the force changes, the same foreman is working for a half shift longer and knows everything that is giving trouble and can spend his time where he is most needed in keeping the changed men out of trouble. Just a few words between the foremen when they change is all the warning needed, because the men are all working, and there is no confusion.

Another nice thing about it is that two foremen are equally concerned about every man on each shift and a man who is spoiling a lot of work under Al's supervision is doing the same thing under Brigden's. It makes an automatic double check on the men and an undesirable does not stay on the payroll so long.

Colvin and Stanley tell us on page 83 that the shop of Boyer-Schultz Corp has always operated two shifts through its history. I will add that it



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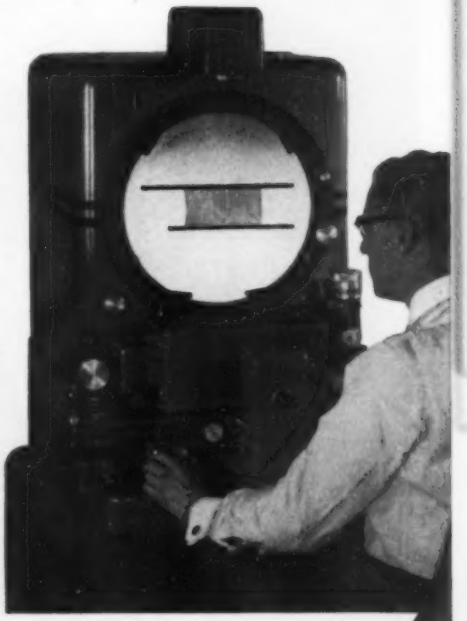
In your area there's an engineer with wide experience in both aspects of optical gaging technique. It will cost you nothing to discuss with him the details pertinent to your own particular requirements. To get in touch with him, write Eastman Kodak Company, Industrial Optical Sales Division, Rochester 4, N. Y.



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is one of the best shops I have ever known.

They also show on page 246 a working-day calendar I devised early in World War I for planning deliveries, but did not then have a labor schedule which I devised early in World War II for four-shift operation and 20 eight-hour work periods weekly, so one is enclosed herewith which you can send to Al.

You can also tell Al that with the tremendous present cost of machine tools, floor space, and all other facilities, only 40 hours use of them a week will run costs so high that we might as well go out of business, and what is indicated is four shifts and a quarter the investment needed for one, so he will do well to show somebody higher up how to lick this double trouble.

Lucien I Yeomans
Chicago, Ill.

•

FRICTION is inevitable when two or more shifts are operated unless one individual is placed in supreme command over all of them. This sounds rather military, but generalship should come from one source instead of many, whether it is in the armed forces or the forces of production.

With one man given authority over the various crews, he is able to create harmony and efficiency which is considerably more to be desired than disagreeable animosity between shifts. In the event that anyone is found guilty of throwing a brick into the works he can quickly be eliminated and replaced with one who desires to play ball.

From my observations, the normal day shift is the ideal whereas the evening crews are at a disadvantage in unnatural hours and artificial light. There is a limit to how much overtime men can be asked to work and still maintain their best working effort—not to mention the effect upon them at making a killing. Breakages are more likely to occur in the off-

. . . because we can prove *which* cleaner is right. That's the catch—and that's why H-VW-M cleaners do the best cleaning job. You see, with our complete facilities we'll prepare samples, apply compositions, buff, try various cleaners—even plate to compare final results. When we've finished . . . duplicated every process and test that a manufacturer will use . . . we *know* we've got the right cleaner.

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hour shifts, especially if there is keen competition between the crews.

I look with abhorrence on such things as prizes or bonuses planted as bait to incite the men to do their utmost when the goal is the best crew in point of output. While it is sometimes advantageous to hang a carrot in front of the lackadaisical mule in order to get him to move, it is not wise to dangle a juicy morsel before a careless jackass who is intent upon doing his damndest regardless of the consequences.

The limit of my experiences was two shifts — a day crew and a night crew. In one instance we were called upon to produce, produce, and then produce. Our equipment was overworked to begin with, and the unnatural stress put upon the machinery was the cause of considerable breakage and its attendant fault-finding by the incoming crew. Most of the trouble seemed to be directed at the night shift of which I had charge. Instead of an overlapping arrangement between the respective foremen wherein they could go over matters of vital importance, the incoming boss was put wise to things by way of a note system. When the day foreman read one of my notes requesting him to do what he could to get the feeding mechanism in working order on one of the turret lathes, he lost no time in scribbling a few lines to me that sort of took the wind out of my sails.

When I arrived on the next evening shift I donned my executive raiment, stuck a five-center in my face and deftly applied the match before reaching up for the day foreman's message. "How would you like to buy yourself a one-way ticket to Hades, and clean up your own mess?" From then on it was sharp knives between the two crews and production dropped and dropped until a supreme commander assumed responsibility. Then things ran smoothly, produc-

"Why can't they give money bonuses like other companies?"

tion soon surpassed the previous effort and harmony reigned forever after.

It is a great consolation to a firm to know that the workers are pulling together and a happy feeling abounds. Calling the shop leaders in for a conference now and then is conducive to combined effort. You can keep breakdowns to a minimum by considerate employees, but a machine will stand only so much abuse. Mechanical breakdowns are nothing compared with breakdowns of the spirit. No amount of effort should be spared to keep this at the very highest.

John Homewood
Ontario, Calif.

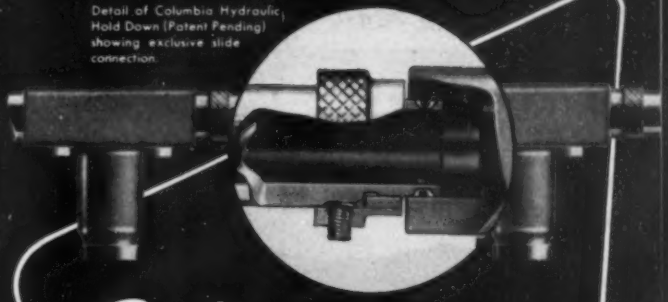
•

THE FRICTION existing between day and night shifts is a very real thing and is a constant source of annoyance to managements because there seems to be no logical reason for it. It is all tied up with human relations which, unfortunately, do not respond readily to logic. All that management can do to improve the relations between a day and a night shift is to try and make both of them balance perfectly as regards amenities, supervision and general administration.

When I was a working machinist, I experienced both night and day work in many plants and came to the general conclusion that the lack of balance between the two shifts was responsible for most of the friction. For instance, why is the average night shift so poorly manned? In a shop employing 100 hands during the day, the night shift would consist of about 20 men under the supervision of a working foreman. The foreman was usually a very easy-going individual who was certainly not picked for his ability as an administrator. He was usually an old hand with long experience of the firm's product and was therefore expected to be able to deal with any technical difficulty which might arise.

Technical difficulties he could certainly cope with, but in maintaining discipline he was hopeless. The result was that the particular night shift that I have in mind was a loafer's paradise. One man in particular that I recall spent his daylight hours building up his small chicken farm and spent the night sleeping on a bench while the cutters on his milling machine whirled around, stirring the air and cutting no metal. Admittedly, this was an old-fashoned firm—a typical locomotive shop—but a competent foreman

Detail of Columbia Hydraulic Hold Down (Patent Pending) showing exclusive slide connection.



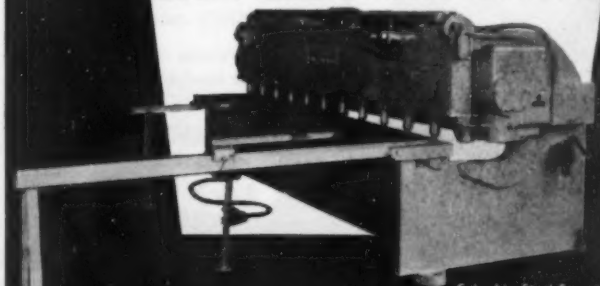
Exclusive . . . . . hydraulic hold down slide connections

● PREVENT POWER LOSS
● SIMPLIFY MAINTENANCE

● Another example of Columbia's advanced engineering is found in the construction details of Columbia Steel Squaring Shear Hydraulic Hold Downs. Threaded connections which, in hydraulic service, are subject to leakage and require excessive space for assembly, are eliminated. Instead, each hydraulic hold down is bolted securely to the shear's front plate, and connections made by properly packed sliding pipe, with sufficient end play to allow individual disassembly. A divided ring at each end of the pipe connection, held securely by a sliding, knurled retainer and hex head set screw, prevents end play and simplifies disassembly. Thus individual fingers may be removed for inspection without disturbance of adjoining assemblies. Internal pressure tends to tighten the joint. Such advanced design features, adding convenience to accuracy and stamina, are making Columbia Shears standard with many of the largest users.

Write for our Bulletin 5229, and the address of a nearby representative qualified to assist with your metal shearing and forming problems. Address your request to Columbia Machinery and Engineering Corporation, Hamilton 2, Ohio

new series Columbia STEEL SQUARING SHEARS and POWER PRESS BRAKES



Columbia Steel Squaring Shear with finger guard removed to show hydraulic hold down. Capacities: 3/16" to 1¼" in mild steel.

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NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

would have increased output considerably. There is not sufficient care exercised in the picking of night-shift foremen. Inevitably, if a foreman is to be chosen from two for the night shift, the choice will go to the least bright of the two. To my mind, the choice should be the other way around.

A night-shift foreman has to cope with emergencies and has to make important decisions on his own initiative because there is no higher executive available to give a decision for him. Then why pick an incompetent foreman to work in this isolated situation?

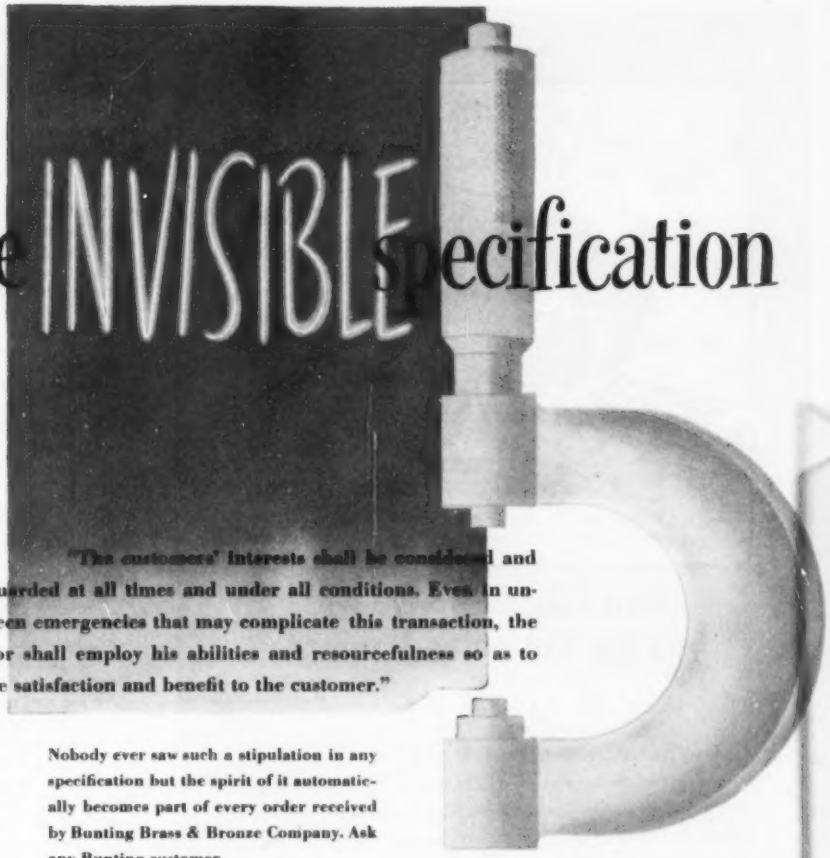
The day-shift foreman is backed up by a full administrative staff of managers and executives to whom he can turn for help. Obviously, the foreman who is in need of guidance and help should be selected for day work, if the decision has to be made.

Cooperation between night and day shifts should be as close as it is possible to make it. The night shift always tends to feel that they are the poor relations of the firm, particularly if they never see their opposite numbers who work in the daytime. There should be some overlap between the end of one shift and the start of another so that members of the two working teams can talk things over with each other. In this way, they earn each other's respect and are able to understand one another's viewpoints.

One firm of my acquaintance engaged on jet-engine prototype work makes the night-shift starting time half an hour before the day-shift finishing time. This system works very well, but is expensive in wages as one man hour is lost at each machine during the half-hour take-over

"Of course, you understand, that's just a rough estimate! The actual time it'll take will be considerably longer."

the INVISIBLE specification



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WELL, MAYBE THEY THINK HE WENT THRU UNDER IT ONCE--BUT THEY OUGHT TO REMEMBER SOL-SPEEDI-DRI HAS STOPPED SLIPPIN' ACCIDENTS HERE!
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period. The firm argues that the saving in work which used to be scrapped by the night shift outweighs the wage expense. There is no doubt that the system has value because the output per man hour is the same for both shifts and the scrap losses are even.

Until both day and night shifts are considered by managements to be equal in importance and the necessary staffing and administrative adjustments made, there will continue to be friction and production losses.

Clifford T. Bower
London, England

•

AL, YOU ARE having a large sweat over a small problem. Many of the larger plants have operated double shifts and have got along without turning wrong side out.

They put me on a night shift once, to break in the bunch, and, at the end of six weeks, we were turning out more production per man hour than the day crowd was.

When we went on duty the first night, we found all of the chests and cupboards padlocked, so we sawed off the padlocks and went to work. The next morning the day foreman gave me hell and I told him that we were not going to be held up because of a few padlocks on closets, cupboards, and bench drawers. He had new locks issued that day, but before he left at night he gave me his bunch of keys and we lived happily ever afterward. He and I have often laughed about it since.

Al and Brigden should get together; a peaceful understanding ought to overcome any friction between them.

As for stripping gears on machines, any repair work should be put in the hands of the plant maintenance department as soon as it occurs. Further, the plant department should be constantly on the alert looking for items which may appear to be weak and are approaching the breakdown stage.

As to having the day crew work overtime in order to make up for a night shift, there are many complications which may arise; it does not pay, and in many cases has proved to be a loss.

With but very few exceptions, the men find that the ordinary working day is strenuous enough; when they take on overtime as a steady diet, they get "workmanitis," and then they are goners.

If Al and Brigden get together, as mentioned above, much might be knocked into Al's ivory where the

blank now is. One can never quite tell.

As for Brigden being after Al's job, there is not much danger of it for it looks as if they were both on the same footing. They should know that cooperation would be good for both of them and this would clean up a disagreeable mess.

Robert Lee Grayford
Worcester, NY

•

THE CONCEPT of the second shift in the minds of the employees who work on them is just what the name second implies. They have second choice in everything. They work the most unpleasant hours, have the hardest and most disagreeable jobs, and get blamed for all the machine-tool failures and scrap. In general, this shift is no utopia.

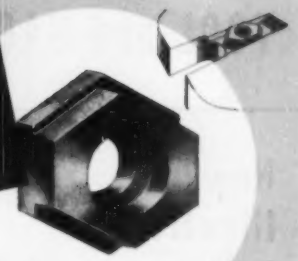
In the case illustrated in your Round Table discussion "Double Trouble," I feel that this foreman has a genuine gripe, inasmuch as he apparently has no supervisory control over this newly-organized second shift. This amounts to the same thing as a husband and wife going to different stores to buy the week's groceries; they would spend twice as much and still might not have enough items to complete a dinner.

Therefore, it isn't enough to tell a foreman in generalities what parts he is expected to do in the course of his shift and let him take it from there. Instead, these job assignments must be exact and complete even to the method and completion time expected, and, wherever possible, unless for a good and genuine reason, the second-shift work should be a continuation of the first shift's program. *This complete set of instructions can only be given by the day foreman.*

Assuming that the supervisor's problem is solved, the following

"Hoo, boy! What a lovely time-and-a-half we are gonna have on this job, eh, Alfred?"

VLIER
FIXTURE KEYS
KEEP IDLE
MACHINES BUSY



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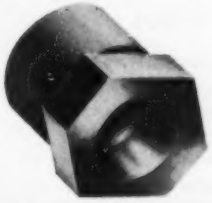
Vlier Multi-Dimensional
Fixture Keys are simple, counter-bored hex nuts, having step-cut sides. They are milled from oversize stock to different cross dimensions which are accurate to ± .0005". By placing these keys in your fixtures, they can be accurately positioned and worked on any idle machine without expensive re-work time. Each key fits three different slot dimensions and eight combinations of sizes are available. All are rust-resistant. Dimensions remain accurate. Truly, they are inexpensive time-savers.



REAMED HOLE FIXTURE KEY

Reamed Hole Fixture Keys
were developed for users who do not want to use milled fixture key-ways. These units have the same accuracy and positive alignment as Vlier milled slot fixture keys. Ask your nearby Vlier distributor to demonstrate their many time-saving features.

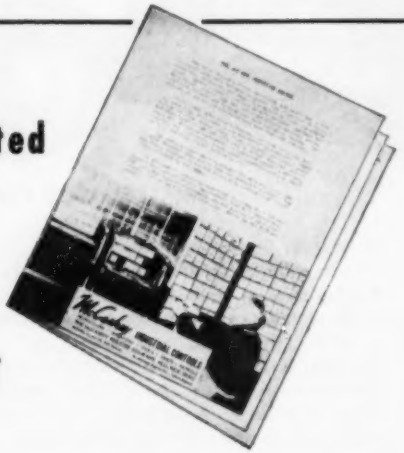
Send today for catalog No. 51.

VLIER MANUFACTURING CO.
4552 BEVERLY BLVD., LOS ANGELES 4, CALIF.
Manufacturers of Spring Plungers, Torque Thumb Screws, Toggle Pads, Spring Stops

HOW TO CONTROL GAGES and TOOL and GAGE INSPECTION

New Illustrated Bulletin

FREE ON REQUEST



. . . describing suggested procedure and showing forms which will give you:

Reinspection date follow-up;

Location and condition of each gage and measuring instrument, loaned or in cribs;

Gage and Instrument History record;

Central clearance record of each employee's gages and instruments;

Tool and gage inspection report;

Gage tag, conditional release tag for tools (fixtures), and faulty tool and gage tag;

Instrument and gage withdrawal order, etc., etc.

. . . all designed for complete control with speed, accuracy and minimum clerical work.

Close control of inspection of your gages, instruments and tools will reduce spoiled work and rework costs . . . and improve your product quality.

Write today for your copy of the McCaskey Tool and Gage Inspection Control Bulletin showing how it can be done.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Send me copy of booklet, "Gage and Tool Inspection Control."

Name .....

Position .....

Company .....

Address .....

AM 9-52

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY
TOOLS • COSTS • PAYROLL
THE McCASKEY REGISTER CO.
ALLIANCE, OHIO
McCaskey Systems, Ltd., Galt, Canada
The McCaskey Register Co., Watford, England

things should be watched very closely:

(1) Work areas and machine tools should be cleaned at the completion of each shift.

(2) Tools should be laid out in a neat and orderly manner and in their proper places.

(3) In the event the shop has an incentive program, careful distribution of the good and bad paying jobs should be made. I might add that there are advantages as well as disadvantages to working nights.

Due to the fact that there are usually less employees on the second shift and consequently less noise, it makes this shift less fatiguing and this factor should definitely be considered. By establishing equality between the two shifts, cooperation and harmony develop automatically.

Lyle C Vinger
Waukesha, Wis.

•

FINDER'S FEE

Will establishment of a "finder's fee" policy result in the hiring of men more suited to specific jobs, men spotted and brought around by dependable employees who know the shop's requirements? Or will it lead to pirating?

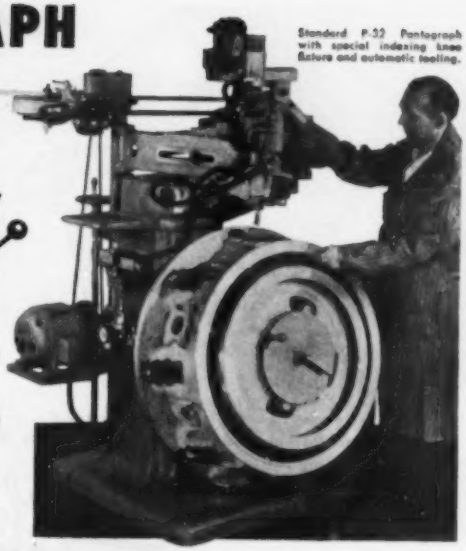
AL IS BADLY off the beam on the general idea of trying to obtain new employees through employees already on the job; when he thinks of giving a finder's fee, he makes it far worse. If the system already being used leaves too much to chance (and the best available system always does), his idea is worse. If troublemakers get into the shop easily under the present system, they will get in far more easily if Al's idea is followed.

The idea has the further weakness that it would undoubtedly tend toward building cliques and family groups in the shop, and everyone knows the evil of that. This shop would soon be tied up so tightly, clique-wise, that it would be like pulling teeth ever to get it straightened out again.

The tendency such a program would have to increase piracy in the labor market is another of its evils, and piracy always tends to kick back. More often than not, a man who is persuaded to leave one organization to join another, upon finding one or two little things about the new organization he does not like, is prone to look back to the "good old days," and to be more or less dissatisfied continually. A man is much easier to satisfy if he has really been seeking

GORTON PANTOGRAPH

Solves Complex Profiling Problems with Automatic Cutting Cycle

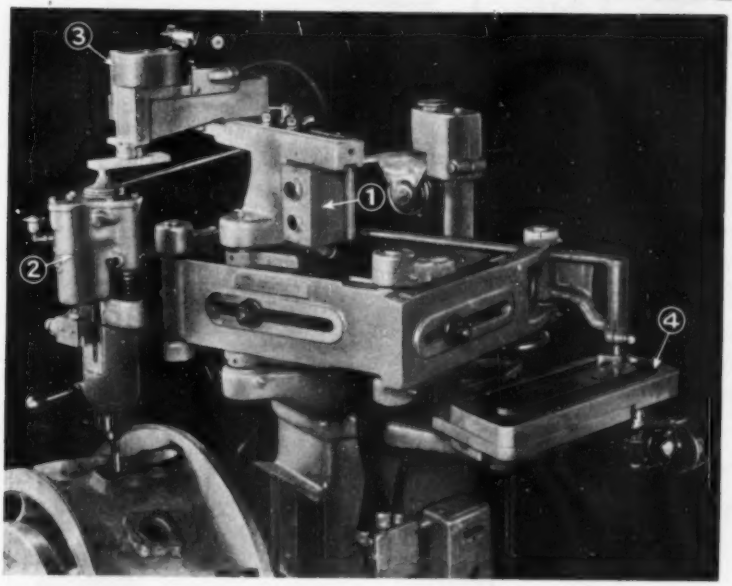


Standard P-32 Pantograph with special indexing knee fixture and automatic tooling.

PROBLEM: Profiling eight ports in outside portion of aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic.

SOLUTION: Gorton P-32 Pantograph profiles all eight ports at the rate of 2.3 minutes per port. Cutting cycle is automatic; indexing is manual.

This is truly a power-driven tracer-control job that would require hours if done by a combination of other methods.



Here's How It Works

❶ Complete cutting cycle begins when "start" button is pressed.

❷ Air cylinder automatically feeds cutter down to cutting position. Cam-operated spindle down feed then takes over. Upon completion of cut and after spindle retracts, this air cylinder further retracts cutter for clearance.

❸ Speed of spindle down feed during cutting is controlled by cam through a Variac.

❹ Motorized chain-driven master starts automatically when "start" button is pressed.

This is just one of many Gorton tracer-controlled production short-cuts which might save you time and money. For complete information, clip and mail the coupon now.

Please send at once complete information about the Gorton line contained in Bulletin 1635-1509

Firm .....

Name .....

Title .....

Address .....

City, State .....

ALLEN ⬡ SCREW . . . SOCKET SCREW

mean the same thing everywhere!

Although *Allen ⬡ Screw* is not in the dictionary, engineers and production men the world over say *Allen ⬡ Screws* to refer to *precision socket screws.* That's how it is with names — probably there's a name that comes to your mind at once as an outstanding *Industrial Distributor* in your locality. He is almost certain to be the one who handles *Allen ⬡ Screw* products. His experience and extensive stock of Allen ⬡ products are the ideal combination to smooth out any problems you encounter in precision fastenings.

THE **BUY** WORD IN SOCKET SCREWS IS **ALLEN**

WARNING
Allen-Type screws aren't necessarily Allen-Made.
Get genuine "Pressur-Tested" Allen ⬡ Head screws in this black and silver box.

a job when he was first employed. Dissatisfaction certainly breeds incompetency, and this would grow by leaps and bounds under Al's idea.

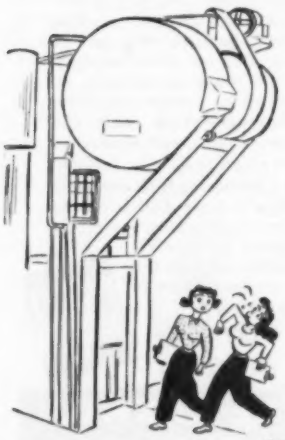
No, there is no better way of obtaining satisfactory employees than by going openly into the labor market, advertising, if necessary, and as extensively as necessary, and using the time-honored method of having employees fill out blanks and giving them interviews. Granted the personnel department has plenty of weaknesses, it is still the best layout that has been developed to date in reference to hiring new employees and placing them where they fit best.

John E Hyler
Peoria, Ill.

•

THERE IS no question in my mind that the dependable employee is a good focal point for obtaining new employees of the type the company desires. A dependable employee who has demonstrated ability and loyalty should be a good judge of the kind of worker he would like to see in his shop. Companies which have been in existence for some time and desire to obtain additional manpower will find the best source to be present employees. Workers in the employ of the firm know the policies and requirements of the company and are in a position to recommend outsiders who possess the qualities needed to fill various jobs.

Of course the "finder's fee" is not the only way to obtain workers when the labor supply is scarce. When available labor is hard to get, or persons are needed who have particular skills, some companies have found



"Stop worrying, Alice! It's not top-heavy, and it won't fall on you!"

30% PRODUCTION SAVINGS... with Jewel Brand Coated Abrasives!

BY SWITCHING TO JEWEL BRAND resin bonded abrasive belts, a manufacturer of cold rolled steel boxes for tools, first aid kits, electronic parts and similar equipment, made production savings of 30% in removing welding beads.

SAVINGS LIKE THESE are possible because properly chosen Jewel Brand Belts cut faster, last longer. And all Jewel Brand Coated Abrasive Belts have the exclusive *Velvet Joint* that eliminates bumping, adds many hours of productivity.

HELP YOURSELF TO SIMILAR SAVINGS by making the simple Waste Barrel Test. Send us a letter size sample (preferably including the joint) of a used belt taken from your waste barrel. In most cases, Jewel Brand Engineers can recommend a Jewel Brand Coated Abrasive Belt that will save time and money for you! No obligation of any kind.

Fill in coupon and send with used belt sample.

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Sure, we want to cut production costs! Enclosed is sample of used belt from our plant.

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POSITION _____

COMPANY _____

TYPE OF PRODUCT _____ MATERIAL _____

WE USE APPROXIMATELY _____ BELTS PER MONTH _____

BELT LENGTH _____ BELT WIDTH _____

pointing problems?

Torrington Swaging Machines produce pointed ends on both solid and tubular work to close tolerances. The swager, delivering 4000 hammer blows a minute, works rapidly and gives the metal toughness and resiliency. Swaging is economical, too, for there is no stock waste.

"The Torrington Swaging Machine" tells the story on the art of swaging, and describes the complete line of Torrington machines. This informative booklet is yours for the asking.

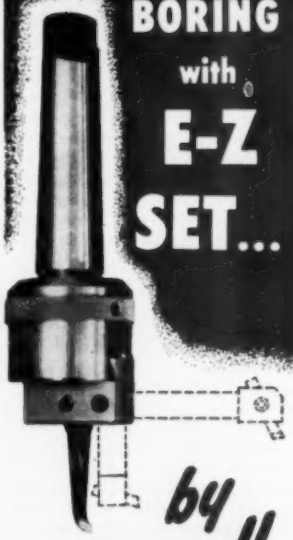
THE TORRINGTON COMPANY
Swager Department
55 Field Street • Torrington, Conn.
Makers of
TORRINGTON NEEDLE BEARINGS

that the way to find them is often that of following the method known as "scouting." This involves making a widespread canvass for people who have particular abilities. Unfortunately, this practice often results in labor pirating. An employer who has given training to develop persons with particular skills loses them to another employer through the operations of the labor scout. The attraction for moving to another job is usually more pay. In this connection, many firms have established policies of not competing in the matter of pay. However, careful study of costs of replacement and training reveals that many companies would find it cheaper to increase a person's pay to meet a competitive level rather than to try to select and train new workers.

While some personnel men do not favor encouraging employees to help friends get jobs in the plant, others have found that the advantages of this method of labor recruiting more than offset the disadvantages. As a rule, a good steady worker will have friends of the same type. During a labor shortage, when it is necessary to use every legitimate device to recruit labor, it has been found profitable to issue introduction blanks to certain employees and suggest to them, if they have any friends or acquaintances who might like to work in the plant, that they give them a card of introduction to the personnel department. Usually these cards are in pads, or books, and on the cover are printed the requirements of employment, or the employment standards of the company. These are for the guidance of the employee in discussing a possible job with his friends. To be successful, this method requires continuous promotion. The best way to do this is to run articles in the employee publication citing employees who have sponsored friends for jobs with the company.

I have seen little circulars distributed to employees in their pay envelopes, which are a constant reminder of the opportunity they have to make some pin money by getting their friends to apply for positions with the company. The usual practice is to pay an employee a small bonus for each new worker so obtained. On such circulars reads as follows: "We invite you to recommend your friends to us. Recommended people will be given full consideration and will be hired if their qualifications agree with those required for available openings. When we advertise for new help, it is necessary for us to pay newspapers for our advertisements. So that our

PRODUCTION BORING with E-Z SET...



by Maxwell

Only the **MAXWELL E-Z Set** boring tools feature **high speed operation, micrometer-like adjustment** to 0.0001-inch and **maximum boring range.**

Interchangeable shanks permit **E-Z Set** boring tools to be used in turret lathe, jig-bore, milling machine, boring mill, automatic or other machine tools. Because they can be adjusted for cut in only one-tenth the time formerly required by similar tools, these **Maxwell-made** tools can meet high-speed production on schedules.

E-Z Set boring tools are available in three models having maximum boring bar capacities of ½, 1 and 1½ inches and covering a range of from ⅜ to 20 inches.

Write today for catalog.

THE MAXWELL COMPANY
380 Broadway • Bedford, Ohio

employees may secure this money instead of the newspapers, we will pay you $5 for each friend that you recommend that we are able to hire. We will pay you an additional $10 when your friend has worked 60 days. Tell your friends that when they fill out our application form, they should be sure to state that you recommended them."

The above circular also included an introduction card to the personnel department, to be filled out by the recommended applicant, stating the name of the friend of the employee and the name of the employee recommending the friend for employment. The card is presented in person by the applicant at the time he applies for employment. Personal recommendation by the employee has the effect of causing him to take a greater interest in his protegé.

It is believed that the practice of utilizing present employees as a means of recruiting good workers makes for good morale because it enlists the cooperation and loyalty of the workers in meeting a common problem with management. Solution of the problem of obtaining dependable help means a better future for all the workers, in helping to maintain production schedules.

Personnel recruiting can also be carried on through outside agencies. With the help problem once again in a tight situation, there is greater need for efficient recruiting. Locating suitable employees possessing desired skills and good personal qualities can be accomplished through use of such an agency.

As far as keeping troublemakers out of the shop, and insuring employment of dependable workers, an efficient personnel department usually has effective methods for ac-

"Will you stop walking around with that spray gun, yelling, 'Which way did they go, Podner?'"

Castings by National

selected for Quality and Dependability

Products bearing these familiar trademarks have all established enviable reputations for quality and dependability. And to guard product reputations, these manufacturers *continue* to specify castings by National —one of the Nation's largest founders.

National's unparalleled experience in producing malleable, heat-treated malleable, and steel castings is at your disposal. Sales offices and engineering facilities are located at all five strategically located plants.

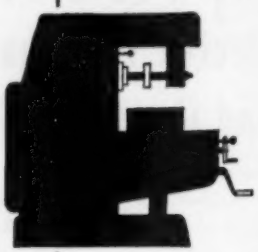
PLANTS LOCATED IN Sharon, Pa., Cleveland 6, Ohio, Indianapolis 6, Ind., Melrose Park, Ill., and Chicago 50, Ill.

A 16mm technicolor film. Narrated by Edwin C. Hill, this 27-minute film tells how malleable iron is made . . . tested . . . used . . . how its production economy, ductility, machinability, toughness will give you a better finished product. Available for group showings.

NATIONAL
Products
FOR TRANSPORTATION AND INDUSTRY

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY
CLEVELAND 6, OHIO

production begins with



Columbus Die-Tool

No tools like the right tools! Columbus Die-Tool designs and builds tools, jigs, fixtures and special machinery to meet your most exacting requirements. RESULTS: operating cost that matches your budget; production that matches your schedule; product quality that matches the demands of your market.

Contact Columbus Die-Tool & Machine Co. first—when you have a special machine problem. They are nationally known as expert designers and builders of special machinery and equipment . . . have been for over 46 years.

Columbus Die-Tool
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ESTABLISHED 1906

Manufacturers of
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

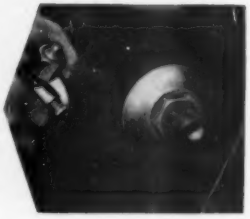
How Pittsburgh Brushes
SPEED PRODUCTION

1. Removing oil film from steel!

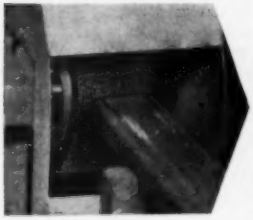
Crown Cork & Seal Co., Inc., asked Pittsburgh engineers to recommend a brush suitable for washing oil film from steel before annealing. A "built-up" brush made of Tampico sections was installed. Oil and foreign matter were completely removed without harming the surface of the steel. Production showed an immediate increase, and time saved due to fewer brush replacements added to the overall savings.

2. Satin-finishing brass fixtures!

Frequent breakdowns and brush changes hampered Bastian-Blessing Company's production of satin-finish parts for its products. Pittsburgh engineers recommended a crimped steel, standard 10" brush. Reports after three years' use show Pittsburgh Brushes have increased production, improved quality and saved materials . . . while lasting *three times longer* than previous brushes!



3. Removing burrs from steel!



Problem: The National Electric Company needed a brush to eliminate burrs and scale, yet the brush had to combine cleaning ability with long life. Solution: Pittsburgh designed a brush to specifications—a brush that was stiff and tough enough to penetrate, clean, and remove burrs and scale, and rugged enough to stand up. Result: An increase in efficiency; a jump in production!

Let Pittsburgh Engineers Solve Your Brush Problems. Pittsburgh's complete line of brushes of every type, for every purpose, will provide a practical and economical solution of any brush problem you might have. Drop us a line on your company letterhead for a copy of our new booklet that shows, through actual case histories, how Pittsburgh brushes help cut your operating costs. Address: PITTSBURGH PLATE GLASS COMPANY, *Brush Div.*, Dept. W-3, 3221 Frederick Ave., Baltimore 29, Md.

PITTSBURGH
Power Driven
BRUSHES
BRUSHES • PAINTS • GLASS • CHEMICALS • PLASTICS
PITTSBURGH PLATE GLASS COMPANY

complishing these objectives when hiring new men. The employees of every progressive company represent a sizeable investment because considerable time, energy, and money have been spent to select and train them. The modern personnel department can neither afford to hire people who lack capacities to become competent and loyal employees, nor can they overlook the provision of proper training to bring out the best each can offer. No longer does a firm just hire people; instead, every effort is made to select the most desirable among those available at any given time. No longer can attention be focussed primarily on the physical aspects of the plant while paying too little attention to the human side; the workers and supervisors. It is just as important to select, train, and allocate competent workers as it is to select and arrange machinery and equipment.

Poor judgment in selection and placement can result only in discontented workers who lose interest in their jobs, spoil material, and waste their own skill as well as the foreman's time.

It is believed that any program for recruiting employees should begin with conserving the manpower the company already has. Every means for developing the proficiency of present employees should be carefully studied before such schemes as "finder's fees" and "scouting" are embarked upon. The use of job simplification techniques to minimize the need for highly skilled craftsmen should be extended. It may be found that certain employees can be used on work where they be more valuable to themselves and to management. A policy aimed to bring about a better utilization of employees, set up so as to circumvent the resistance of supervisors to promoting workers whom they have trained to do their

Why the guys on the lathes next to the windows never seemed to make any mistakes.

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KENNAMETAL TOOLS,
BLANKS, and INSERTS
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This expanded service enables you to quickly realize the plus value of Kennametal tooling — decreased cost — increased productivity. There's a Kennametal tool for your every need.

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CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

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STEEL FROM STOCK

Here, at a glance, is a quick review of more than a century's progress in the delivery of Ryerson steel.

The original Dobbins made their plodding rounds from a single small iron store. Today, their mechanized successors speed delivery from a network of fifteen huge steel-service plants.

And, while the first Ryerson wagon carried such products as saddle tree, horse shoe and boiler iron, today's giant trucks deliver an almost endless variety of carbon, alloy and stainless steels.

The Ryerson sales representative, too, has changed with the times. Today he heads up a team of specialists who are ready and able to help you on every problem relating to steel from stock.

While current demand may deplete supplies of some sizes, our overall stocks are large and complete. And you can always count on the same friendly will to help that steel buyers have found at Ryerson for 110 years.

PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS . . . BARS, STRUCTURALS, PLATES, SHEETS, TUBING, ETC.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

present job well, might be considered. A grouping of jobs to determine the physical requirements, skills, and aptitudes needed for each group should be undertaken. These standards will vary in accordance with the type of training the company is prepared to do. The net effect of these and other manpower conservation methods is to concentrate recruiting effort in the less specialized and skilled jobs, so that workers with little or even no experience may be employed. In most well-regulated personnel departments today all workers are asked to list their secondary or additional skills, and in some plants this record of additional abilities is instrumental in preventing men from being laid off in one department while others are being hired in other departments of the same plant. It is obvious that many workers are often capable of doing more than one job, and are in many instances not employed at their highest skills. To obtain efficient production, workers should be at work at their highest skills. Where management undertakes such conservation studies, the utilization of the "finder's fee" may be found unnecessary.

Harry Kaufman
Philadelphia, Pa.

•

THE OBTAINING of good labor under today's conditions is like trying to find gold in a coal mine. We have suddenly come into an era where our productive labor, or at least those who desire to be productive, are very scarce. The reasons are too numerous to list completely. We all know some of the factors, such as defense construction, lack of proper-

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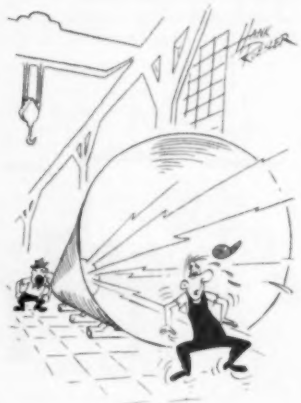
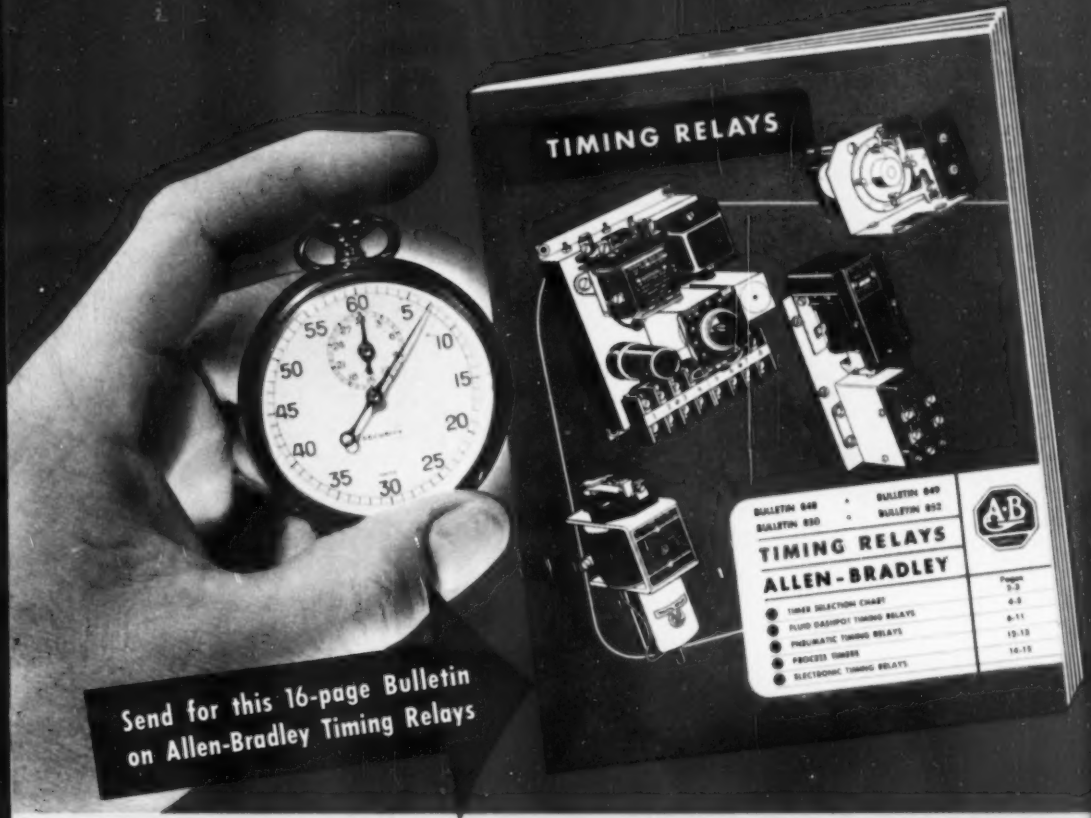


"How about that 5 bucks you owe me?"



FOUR POPULAR TIMERS • SIMPLE AND DEPENDABLE

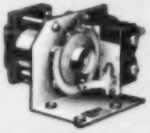
PNEUMATIC

Bulletin 849 pneumatic timing relay is a long life timer of high repetitive accuracy. Has an adjustable pneumatic bellows for regulating the tripping time. Time delay minimum—¼ second; maximum—3 minutes. The operation of this pneumatic timer is easily changed from "on delay" to "off delay." A reliable, compact timer that is available in a wide variety of contact arrangements. It can be furnished in open type or in enclosures of various constructions.

FLUID DASHPOT

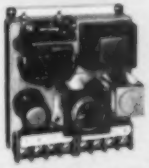
Bulletin 848 fluid dashpot timing relay is a low cost, adjustable timer for applications not requiring a high degree of accuracy, such as for timing electrically operated valves, motor starting sequences, etc. Time delay minimum—2 seconds; maximum—30 seconds. Single pole contacts, either normally open or normally closed. Silicone dashpot fluid assures consistent action at low ambient temperatures. Furnished in open type for panel mounting, or in pressed steel and cast iron enclosures for every service.

MOTOR DRIVEN



Bulletin 850 Style L motor driven timer is a precision switch of the maintained contact type. It alternately opens and closes two switch units 2, 3, 4, or 6 reversals per min. Ideal for controlling reversible machinery such as laundry washers or other processing equipment. Run and drift time easily adjusted. Silver alloy contacts.

ELECTRONIC



Bulletin 852 Electronic Timer has a thyratron tube used as a combination a-c rectifier and electronic switch. In 8 timing ranges from 0.025 sec. to 2 min. Accuracy 2% of setting. Ideal for machine tools, high frequency heating equipment, and photographic printing.

STANDARD ENCLOSURES FOR EVERY SERVICE

NEMA Type 1

NEMA Type 4

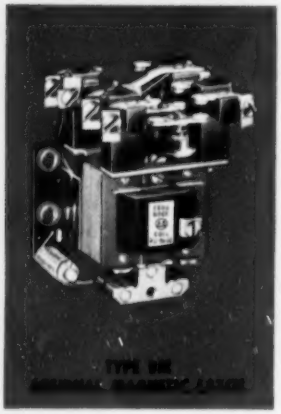
NEMA Type 7

ALLEN-BRADLEY
QUALITY
TIMING RELAYS

Allen-Bradley Co., 1310 S. Second St., Milwaukee 4, Wis.

6-52—MR

HUM-FREE A-C RELAYS

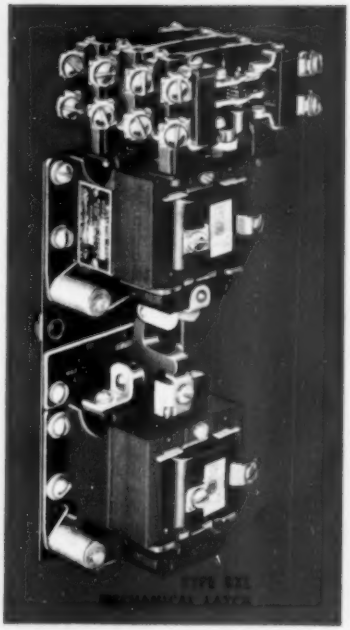


Here are two unique, hum-free relays that require no coil current to keep them closed.

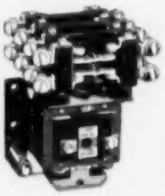
The Type BM relay is a compact unit which is closed by momentarily energizing the solenoid coil. The relay is held firmly closed by residual magnetism until opened by a momentary demagnetizing current.

The Type BXL relay is a standard Bulletin 700 magnetic relay with a mechanical latch. The secondary solenoid, beneath the relay, delatches the upper relay to open it.

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

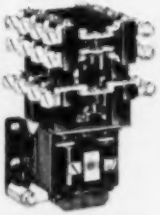


A-C and D-C TROUBLE FREE CONTACTORS and RELAYS
for Automatic and Sequence Controls



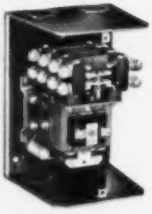
4 Pole A-C Relay

This universal type relay is equipped with four normally open contacts and four normally closed contacts, all actuated by one solenoid plunger. Great flexibility of circuit connections is offered by the double arrangement of contacts. Will handle circuits up to 600 volts a.c. Widely used in refrigeration and air conditioning. Contacts need no maintenance.



8 Pole A-C Relay

Bulletin 700 relays are listed in many contact combinations and polar arrangements. They are widely used for oil burners, stokers, unit heaters, and as control relays for electric furnaces. They are good for millions of trouble free operations. Their consistent performance makes them ideal for machine tool sequence operations. There is no contact maintenance.



Relay in Enclosure

These relays can be furnished open or in enclosures that protect them in applications where watertight, weatherproof, or explosion-proof enclosures are needed.

Push buttons and limit switches available in a variety of enclosures.

Send for Allen-Bradley Bulletin 700 for details of relays with 1, 2, 3, 4, 5, 6, 8, and 10 poles.

3-Wire Thermostat Relay

Low Current A-C Relay

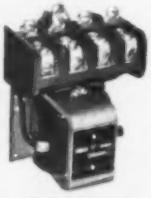
For temperature controls with thermostats.

D-C Relay

2 N.C. —1 N.O. contacts.

A-C Contactor

Allen-Bradley a-c contactors are available up to 900 amperes.



D-C Contactor

Allen-Bradley direct current contactors are available in single and double pole construction up to 600 amperes.

ALLEN-BRADLEY

RELAYS & CONTACTORS

6-52—R

ly training our youth in skilled work ten to fifteen years ago, and many other reasons.

What can we do about it now, and how can we attract workers to our business or factory are questions which not only have our personnel directors puzzled, but also upset the foremen who always get the blame when production does not maintain its standards.

The idea of giving money to an informant is very unsound. First, it opens up an avenue of graft that previously had been unheard of. Let us consider this a moment. The policy, let us say, has been established whereby Company X pays $10 to a person recommending and getting a worker employed. The sum of $10 seems little to the company and the additional sum of $25 for 6-months' service of work still appears to be a good deal. Now this policy becomes known outside of the plant and in walks Mr Y. Mr Y suddenly starts to bring in men — they are good men and are hired. Other concerns suddenly find themselves faced with a loss of help and they decide to use the same policy. However, instead of $10, they offer $25. About this time Mr Y leaves the company X and joins, let us say, company T. He starts his program all over again—men suddenly start leaving company X on an almost wholesale scale. They are the same men company X recently hired. These men go to work for company T and Mr X collects $25 per man. This money is split between the group under his control. Before long and definitely before the companies realize their foolishness, the idea of a finder's fee has boomeranged into a blackmail business. All workers within an area become involved and each company has to pay.

"I understand the new management has declared war on clock watchers!"

HERE IS A POSITIVE METHOD THAT

Eliminates

ALL ERROR

ALL CHANCE

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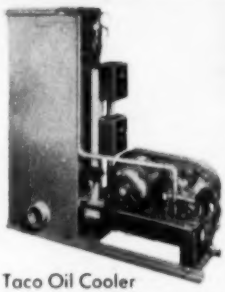
by controlling Cutting Oil Temperatures within 5° F...


Taco Oil Cooler

A well known and respected manufacturer (name on request) using a New Britain Gridley Automatic Bar Type Screw Machine increased his work pieces per 10 hour period from 1600 to 2650 . . . when he controlled his cutting oil temperature with a Taco Oil Cooler. He also increased his work pieces per tool from 2200 to 2730.

Users of Taco Oil Coolers for machine tools are buying additional coolers based on their own experience.

Why not ask for a Taco Sales Engineer to make a recommendation to you?

Better Cooling—Better with Taco

Taco

TACO HEATERS, INCORPORATED
137 SOUTH STREET • PROVIDENCE 3, R. I.

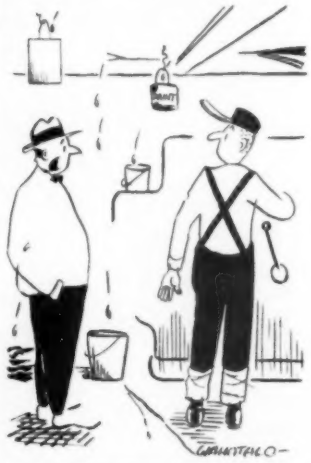
Policies foolishly instigated to compensate an individual or group to get additional labor are dangerous and could ruin the entire industrial setup. How then should we proceed? One factor which too many companies ignore is that their business is only as good as their workers. The employment of men and women to produce a product is the life of any company. Should this be a loosely-managed, poorly-constructed line of operation, then the company can never become what it could become with proper management and proper handling of human relations.

A few companies have reorganized this and are successful. They have no labor troubles—people are constantly applying for jobs with them and in many instances a waiting list is maintained. All employees are happy and when problems arise which affect their lives or the company they are ready to aid each other and each worker puts his shoulder to the wheel. The employee is then a part of the company.

In bad years the company does what it can for the employees. In turn, the employees take reductions, knowing that it is not a way to get more work for less pay. For in good healthy years, the company pays off in bonuses and better working conditions.

You may say all companies can not do this. Perhaps you are right, but how many companies have honestly tried? Too many have only half-heartedly tried. Top management has said "yes," but with its tongue in its cheek. These companies never live up to their word.

One thing sure, the only way today to get help and keep help is to estab-



"And why have you no faith in our maintenance department?"

lish a fair wage policy, good working conditions and to tell the world in general and your community in particular, about the company. Keep what you are doing, how your production is growing and what you offer to your workers before the general public. In this way you attract attention. You make people interested in your company; they become curious about you and will investigate. Then your personnel director has an opportunity to talk with them personally and to convince them that your company *is* a good place to work. This policy is sound and is in keeping with good industrial practice. It will not cause hard feelings among other companies within your area.

Charles D Townsend
West Hartford, Conn.

•

DON'T you think that if such a rewarding plan were put in force, as Al suggests, that it will contribute its share to the "gimmes" so increasingly manifested during the past two decades? It looks to me as though it is just following along with the present administration policy of handing out instead of putting forth to build within.

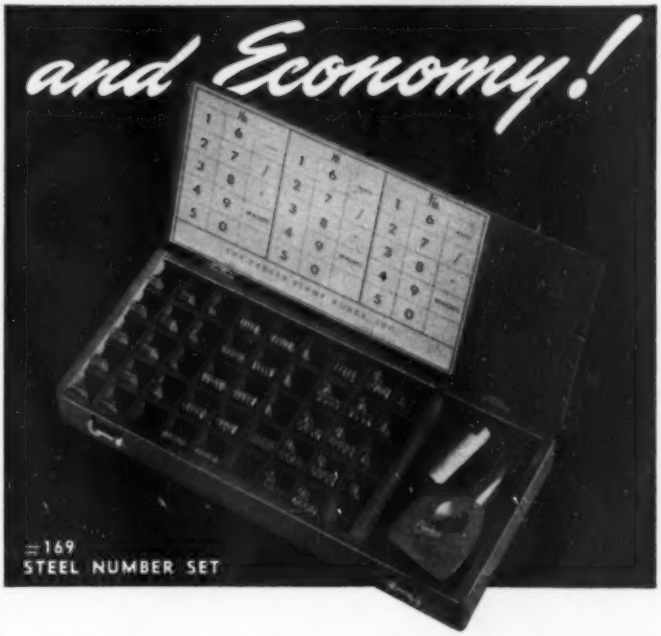
Is any scheme wherein employees are baited with monetary rewards worthy of consideration when there is likelihood of backfire? Should we not do our utmost to build employee character by putting the cards face up on the table and letting them see the possibilities of their enthusiastic cooperation? Show them wherein the availability of good employees will eventuate in their ultimate benefit through profits for the company which in turn will justify higher wages and dividends.

Why should the worker, whose economic happiness depends upon the efficiency of the plant in which he works, have to be baited with financial rewards when the continuity of high production will, in the long run, result in his benefit?

A scheme in which an employee is rewarded financially for his part in building up the personnel of the plant is a scheme with a sandy bottom. Obviously there will be an incentive at first, but this will eventuate in questionable results leading to demoralizing habits. This is only another avenue for developing chiselers.

I see no reason why, if the employees are informed of the need of certain talents, they wouldn't be on the lookout and notify the personnel of their availability. If the employees are satisfied with their con-

NEW MARKING FLEXIBILITY



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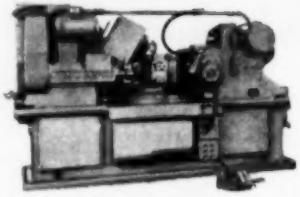

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MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

ditions you can depend upon it that any troublemaker hired will soon be spotted and eliminated. You can't prevent troublemakers from getting into a plant but you don't have to let them stay.

With the incentive system the employers would have to organize and adhere strictly to ethical standards in order to keep hands off each other's good men. For ten bucks a head I could go out with a large market basket and make a killing in eight hours, and I'd be tempted not to be so particular in my selection.

J Everett
San Francisco, Calif

•

THE OLD SONG that says, "A good man nowadays is hard to find," strikes a responsive chord in the hearts of those who see production lagging for the want of capable machinists, so the idea of a finder's fee may not be as far-fetched as it sounds.

As Al says, the personnel department may be well trained in the matter of interviewing prospective employees and putting ads in the local paper, but very few of the white collar boys have the entree into those places where the more or less "horny-handed sons of toil" foregather, whether it be lodge-room, barroom or union local. These are spots where the various places of employment are cussed and discussed by men well-fitted by experience to know the good shops from the bad, and by that same experience able to evaluate and discriminate between the dependable man and the drifter.

Let us suppose that Al puts his plan in effect. It would be foolish to expect that his men are going to dash out and send the first unemployed

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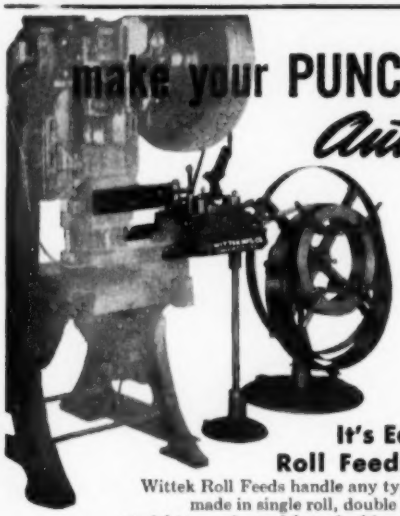

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Wittek Reel Stands facilitate handling coiled stock.

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Automatic ROLL FEEDS AND REEL STANDS

brother they happen to meet because of the cash inducement. After all, they have to live with Al after the big rush is over. So they look the field over with care and send only the fellows who are likely to reflect credit on their ability as recruiting agents. I think there is more to it than merely earning a bonus and a pat on the back from friend Al; the average man likes to feel he can pick a winner in the shop as well as at the racetrack.

Which brings us down to Ed and his remarks about pirating. It has always been a remarkable, not to say incongruous thing to me, to hear the average business man defend the private enterprise system and the profit motive by which most of us live, then perform an about-face and holler out loud because his competitor takes one of his employees away from him by offering a better salary or working conditions.

When all is said and done the employee is a business man as well as the employer, and as such, subject to the law of supply and demand that governs private enterprise. He has the same right to find the best market for his services as the employer has to find for his product.

Incidentally, if we wish to be realistic about it, the employer has a greater chance of attracting the better type of worker if he is willing to turn back some of his earnings into improved working conditions and better equipment. While the average worker is not immune to the attraction of that extra dollar in the pay envelope, he is also quite susceptible to wholesome atmosphere in the form of a clean, well-lighted shop with good tools and equipment, as well as first-rate locker and washroom facilities. Maybe if Al and Ed put their heads together and took an objective look at what their company had to offer a new worker, they might be able to come up with some ideas that would solve their labor shortage problem and eliminate the finder's fee!

Robert S. Alexander
Greenville, RI

•

THE PAYING of employees to act as "talent scouts" seems to me to be absolutely unnecessary; it is highly probable that the new recruits will be personal friends of the employee who will not persuade them to work at his firm simply for the sake of a few dollars.

If an employee likes his job and thinks that he is working in the best firm for miles around, he will not hesitate to let it be known to all and

sundry, free of charge. If a man recommends one of his friends to try for a job at his own plant he will make sure beforehand that the friend will fit in. If the employee values his friendship with the new recruit, he will certainly not recommend him to a situation in which he will be unhappy and unable to cope with the work. He expects the friendship to continue, and it is likely that he will study the whole problem very carefully before suggesting that his friend take on the new job.

On the other hand, if payment is made for bringing fresh lambs to the slaughter, then it is highly possible that the loose characters in the shop will make the best scouts. I think it is a fact that the nomadic type of bachelor machinist who has no roots, comes into contact with more fresh faces than does the steady and esteemed citizen. This scraping up of acquaintances by the roving type of individual happens every week and he is not able to know much about the men he recommends to his employer, because he rarely makes lasting friendships.

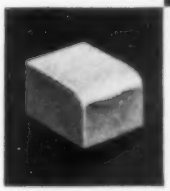
By all means, management should invite introductions of new men from their employees, and should consider very carefully the offers made, but they should not load the full responsibility for the choice on to the employee who introduced a misfit. I might mention that experience has shown that if a firm gets no results from its employees after issuing an invitation for recommendations, it had better do some soul-searching and try to find out why nobody wants to work there.

I don't think the term "pirating" as applied to labor moving from one firm to another is a very fair one. When changing jobs, the workman is on his own and carries with him his labor and skill as a bargaining weapon. There is nothing very much that a trade union can do if a man wants to make a move, except to help him find a new job. If the workman has already found the job he

"It's a vicious circle—we demand more money and get it—our wives demand more money and get it—"

From deburring tubing . . .

to sanding bevels



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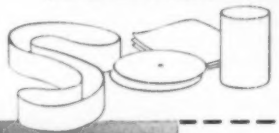

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Then Wellman turned to the reliance of the Profilometer.

With the Profilometer, Wellman production men found they were grinding and lapping the thin clutch discs far too accurately—from six to ten microinches—thus causing the disastrous warping and burning. It was also found with the Profilometer that grinding and lapping time of the discs could be cut to a minimum due to accurate on-the-job surface measurement. Surface finish was held to the specified 32 microinches. And most important of all—scrappage was almost entirely eliminated and production increased over 100%.

This is just another example of the ever increasing use of the Profilometer as an important *shop instrument.*

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wants, I fail to see any logical reason why he should not sell his services to the best customer.

It is a fact that rival firms often enter into agreements with each other not to hire each other's labor. It is a system that is still practiced in Britain, I am sorry to say. Even this system is not perfect because it generally requires that the employee shall not move from one firm to another directly but shall arrive at the new job by means of a detour. What happens is that a secret arrangement is reached by the new employer and the workman. The workman takes another job with a non-rival firm and holds it for a few weeks, then packs it up. He then takes up his new appointment with the firm who should not employ him and everybody is satisfied because the man did not pass directly from one rival firm to another. The system is farcical, but I speak from personal experience. Generally, it only happens when the workman has special skill which he can sell in a higher-priced market.

The free movement of labor is a democratic privilege that should be unhampered. We had a system during the war which, at its face value, was very much akin to a dictatorship. A man could not be fired and an employee could not change his job without the sanction of the Ministry of Labor. Actually, the system worked out very well because disputes about hiring and firing were often settled around a table with the government representatives hearing both sides and trying to find a solution satisfactory to all. A lot of bullying employers were given rude shocks and told to set their house in order, and some trouble-making employees were threatened with jail or conscription into the armed forces. Movement of labor has now been freed, but the employer and employee must work through the government labor exchange. This is to insure that labor be persuaded to go where it is most needed, in the interests of national defense.

The British system of recruiting labor and finding jobs through the government labor exchange is, to my mind, far more efficient for both employer and employee, than is the free-for-all scramble practiced in the USA. I have had personal experience with both systems. Under the British method the employee goes to the exchange when he wants a job, the employer goes to the exchange when he wants a man. Both parties are brought together and can reject each other if they desire, and try again. The point is, that there is one cen-

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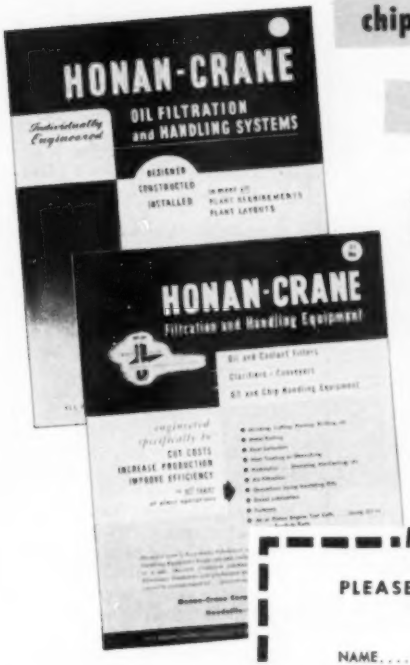

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tral spot in every town where a man can apply for a job and at the same central point an employer can be sure of finding a man, if there is one available. And neither party pays anything extra for the service. There are no middlemen such as "job counselors" or other individuals with high-flown titles exacting a levy on the movement of labor.

With all due respect I must say that the lack of support by American employers for their own state labor exchanges, which they pay for in taxation, struck me as carrying independence to ridiculous lengths.

Clifford T Bower
London, England

NEW BOOKS

DESIGN AND USE OF CUTTING TOOLS—*By Leo J St Clair, cutting-tool consultant. First Edition, 437 pages. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36, NY. Price $7.*

A book written entirely about single-point tools is unusual. Yet even more than the 437 pages in this volume could be devoted to the subject, especially by a man with the experience of Mr St Clair. He has lived with cutting tools for more than 25 years as sales engineer, consultant, and owner of a plant that turned out cutting tools in wide variety. Also, Mr St Clair is responsible for a number of important developments in cutting tools, particularly the methods for brazing tips, both hardened HSS and carbide, to steel shanks.

The book was written because of the evident widespread lack of knowledge of how to grind and apply single-point tools. Few men in the shop can grind a tool properly for any and every job, as could the proverbial foreign-trained journeyman machinist. Since this misuse and abuse of cutting tools is extremely costly to industry, Mr St Clair decided to write a book that would serve as an educational text for people who grind tools, for use in training classes and for the information of process men, tool designers and tool engineers.

There are 18 chapters in the book. The first 13 chapters discuss all of the important geometrical features of a single-point tool; namely the single-point tool itself; the side relief angle; how to measure angles; the end relief angle; nose radius and point-angle relief; the clearance

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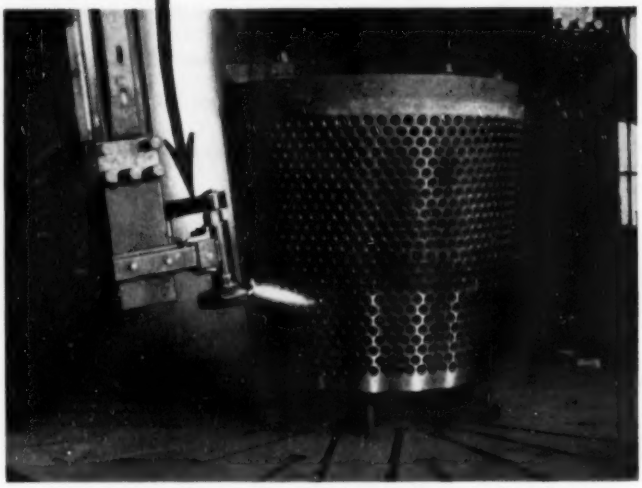

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angle, peripheral grinding; the side rake angle, the back-rake angle; the side-cutting edge; the end-cutting edge angle, the nose radius and point angle, and cutting rake angle.

Suppose, for example, you read first about the side relief angle. Usually, in the literature this is dismissed with the remark that "6 to 8° side relief is satisfactory." But is it? How does excessive or insufficient side relief affect tool life? Just where does wear occur? The author demonstrates by diagrams. He shows the results of tests. And he tabulates the side relief desirable when machining 19 representative materials with HSS, cast alloy and carbide tools. It is this kind of detailed approach, based on experience, that is used throughout these chapters.

To round out the subject properly, chapters are given on: proper choice of cutting tools, cutting edge *vs* chip formation; chip breakers, speeds and feeds; and grinding of cutting tools.

This work is one of the more significant metalworking books to appear in recent years. It should interest people in shops large or small, because the proper use of single-point tools is a common need. Furthermore, men who have a sound grounding in the single-point tool can understand better the more complicated multi-point tools. The same cutting tool principles that apply to the single-point tool apply to the individual tooth.

•

PRACTICAL CALCULUS—*By C I Palmer and Claude E Stout, Professor of Mathematics & Engineering Mechanics, General Motors Institute, Flint, Mich. Revised 2nd Edition, Published by McGraw-Hill Book Co, Inc, 330 W 42nd St, New York 36, N Y. 470 pages, price $6.*

This book makes calculus as simple and easily understandable as possible—without loss of accuracy. The only thing of note missing are derivations of many of the formulas, and yet the meaning of calculus is clearly shown. Hundreds of practical problems and many illustrated examples ensure that the student knows how to use the tool he has mastered.

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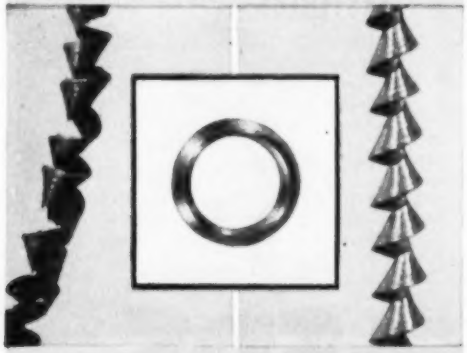

Metal curls from automatic screw machine making small part in the center. Clear metallic color of chip at right from machine using Wax-Cut shows extreme reduction of heat, compared with burned chip taken from machine using E.P. oil.

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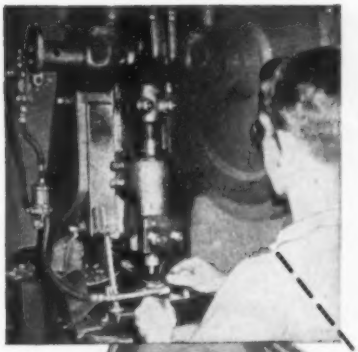

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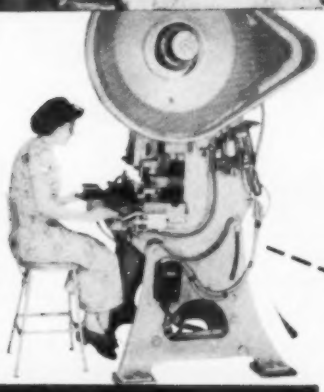

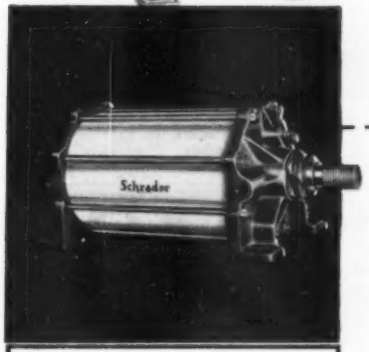

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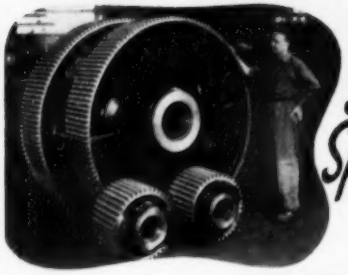

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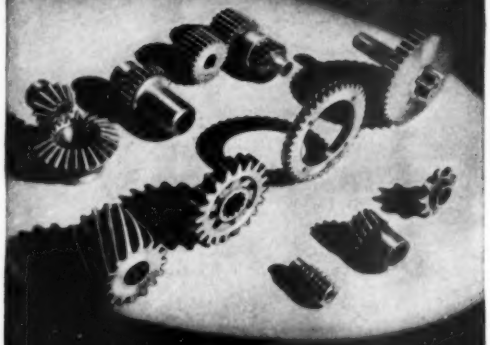

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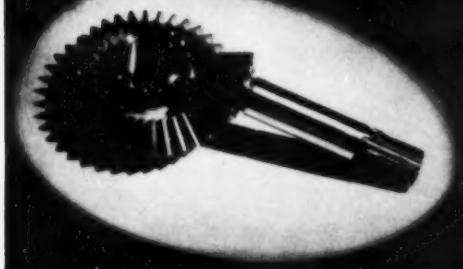

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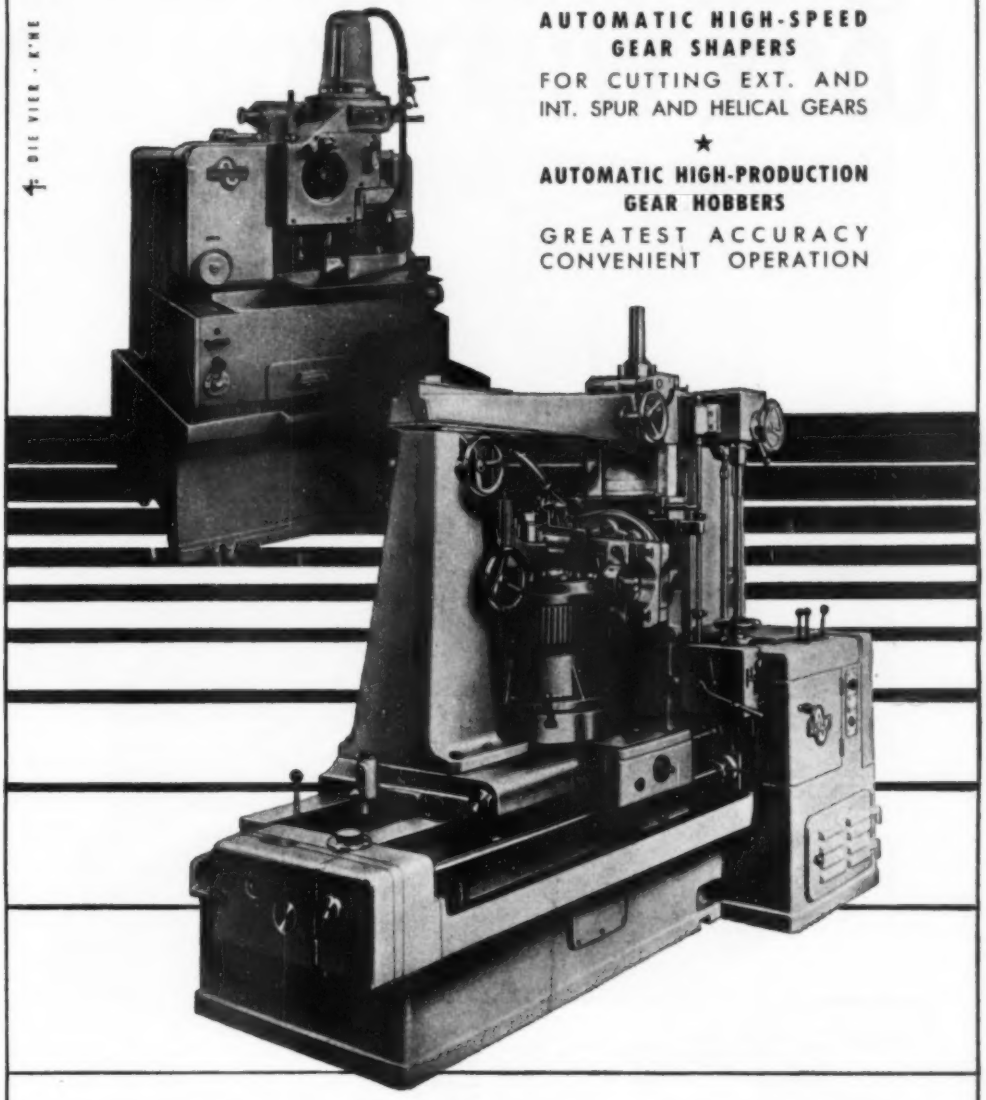

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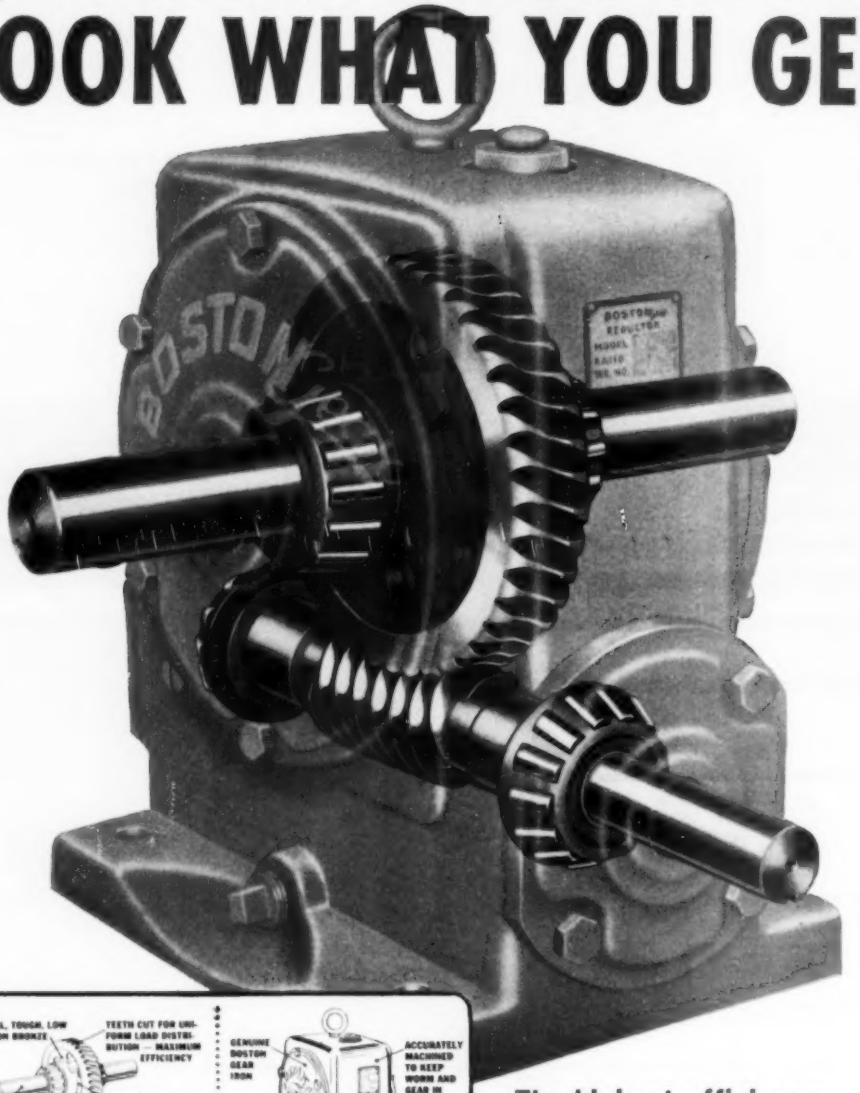

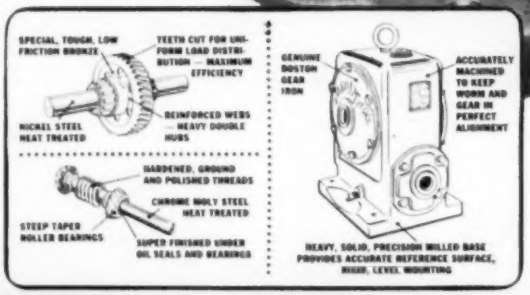
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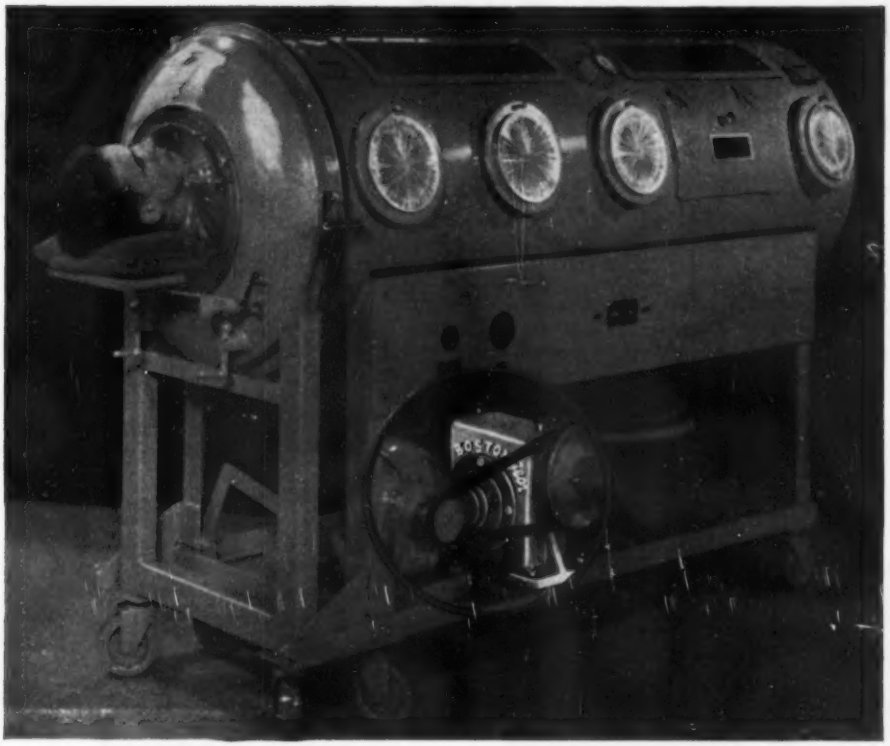

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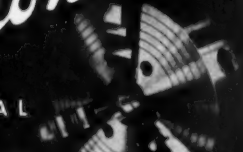

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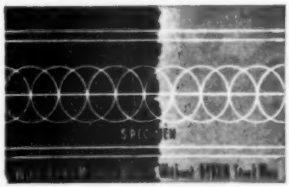


Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2301 B North 11 St., St. Louis, Mo.

When you're looking for a machine that will **MILL, DRILL, BORE** *and* **SHAPE** *at* **ALL ANGLES WITHOUT CHANGING SETUP**

you're looking for the

Bridgeport TURRET MILLING MACHINE

Here is a machine that die shops, tool rooms and production lines are keeping busy every day, saving time, conserving effort in handling countless jobs of all kinds in a way that the "BRIDGEPORT" and only the "BRIDGEPORT" makes possible.

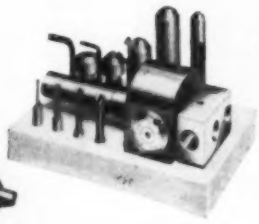
The exclusive features of "BRIDGEPORT" performance are recognized and accepted wherever there are metal working shops. That is why countless thousands of these machines are modernizing methods in tool rooms, die shops and production lines. Obviously, ability to drill, mill, bore and shape at all angles of the work without changing set up results in maximum machine time, minimum down time, and maintained accuracy through every operation. Modernization of your methods through installation of "BRIDGEPORTS" pays off quickly, because the "Bridgeport" price is low while returns on the investment are exceptionally high. It will be to your advantage to get complete information . . . NOW!

Milling Machine Vise

An improved vise providing great gripping power. Streamlined for attractive appearance and equipped with coolant trough. Rigid holding through screw of large diameter. Made in two sizes: 5"x 3½" and 6"x5" jaw openings.

No. 3 HEAVY DUTY RIGHT-ANGLE ATTACHMENT

For milling and drilling at right angles. Used also for boring and reaming, cutting gears, hobs and broaches, sawing and slitting.



No. 2 Boring Head

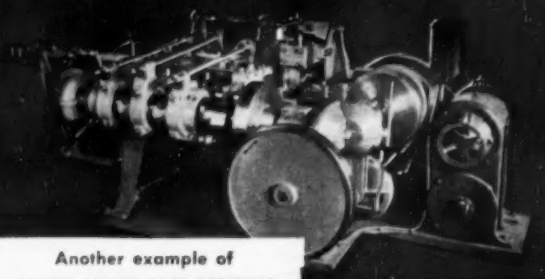
Boring Tools and Holder provide the means of boring holes up to 6" diameter. Available for use on Bridgeport 1 HP Milling, Drilling and Boring Attachment.

Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

PRODUCTION RECORDS *Broken* with NILSON 4-SLIDE Machine!



Another example of

FASTER, LOWER COST FORMING of Ribbon Metal Stock

★ *180 Terminal Contacts* **Per Minute** ★ *7 Separate Operations* **Eliminated**

A famous national manufacturer tripled production of the Terminal Contact illustrated above (in actual size) and reduced production costs proportionately by replacing several progress die set-ups with one **Nilson 5-3-F** four side machine. *Seven separate operations were eliminated;* 180 completed contacts produced per minute. Time required for tooling changes was reduced 50% over similar type machines.

This example clearly shows the big savings you can make in overhead, maintenance, labor and time with a Nilson 4-slide!

Taking stock directly from the coil, **NILSON** metal ribbon stock four-slide machines automatically feed, straighten, pierce, blank, swage, stamp, coin, cut off and perform up to five forming operations with speed and accuracy. Built in five models with capacities up to 2½" wide and feed lengths up to 15". For specific recommendations on your wire and ribbon metal forming problems, send details, prints or samples of your operation to us when you request the bulletin.

THERE'S *STRONG LIKE A* NILSON

Specialists in Wire Forming Equipment for Over 50 Years

THE A. H. NILSON MACHINE COMPANY

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OTHER NILSON PRODUCTS:

- Automatic chain-making machines
- Automatic staple forming machines
- Wire and Strip reels
- Foot Presses
- Wire straightening equipment
- Slide Feeds for Presses

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try A GAY-LEE SURE CURE

SOLID CARBIDE "SMALLSAW"

Costs on small slitting and sawing production operations can be kept in line with Gay-Lee long wearing carbide. Diameters small as ¼".

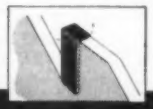
SOLID CARBIDE BRAZED HUB

A natural commutator undercutter. Brazed hub ring gives positive support, rigidity and alignment. Diameters up to 3", patented.

CARBIDE TIPPED "THINSAW"

For precision slitting and sawing. Carbide tip has strong circular seat with more braze area. Tolerances held to .0001", diameters 1½" to 5", thin as .030". Pat. app. for.

CIRCULAR TIP SEAT GIVES EXTRA STRENGTH



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NO BLOWER OR POWER NEEDED . . . *just connect to gas supply*

Here's speed, economy and lifetime service in this most efficient and economical soldering and general purpose bench furnace. This 222 furnace heats a pair of 12 lb. soldering coppers in 8 minutes. Can be used for melting lead, heating small tools, etc. Since 1911 BUZZER Soldering Furnaces have been the equipment of thousands of industrial plants, shops and schools.

Write today for catalog showing various types of furnaces, burners and other equipment.

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BALANCED VANE TYPE HYDRAULIC MOTORS

SIMPLE DESIGN - RUGGED CONSTRUCTION

AUTOMATIC WEAR COMPENSATION THROUGHOUT MOTOR LIFE

HYDRAULIC BALANCE MEANS LONGER LIFE AND LESS MAINTENANCE

CONTINUOUS DUTY RATINGS TO 26 HP

GREATER ADAPTABILITY

(Above) Series 200 Vickers Hydraulic Motors available in two sizes with flange or foot mounting.

(At Right) Series 500 Vickers Hydraulic Motors available in two sizes with flange or foot mounting.

COMPACT - LOW WEIGHT

EXCLUSIVE "ROCKING BEAM" CONSTRUCTION

DYNAMIC BALANCE AND QUIET OPERATION

COMPANIONS TO VICKERS BALANCED VANE TYPE PUMPS

Two series of Vickers Balanced Vane Type Hydraulic Motors are now in production. They offer many advantages for the economical and efficient application of variable speed rotary mechanical power to machine tools, industrial machinery and mobile equipment. Some of their important features are mentioned above; for further information get in touch with your nearest Vickers Application Engineering Office.

Write for NEW Bulletin M-5102

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

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FOR DOUBLE EFFICIENCY . . .

Combination FILING and SAWING MACHINE

HAHN & KOLB MODEL HK 3C

This combination machine includes two work tables so that two independent working units are available . . . both with infinitely variable speeds.

The wide cutting speed range of the bandsaw enables the machine to handle the strongest steel as well as a variety of other metals, plastics, fibres, leather, wood and rubber!

STOCK DELIVERY NO PRIORITY REQUIRED

PARTIAL SPECIFICATIONS

Stroke of blade or file	0 to 4¾"
Gap of saw frame to center of table	9"
Maximum thickness of work	3⅛"
Size of table	15¾" x 15¾"
Length of files	4", 5", 6", 8", 10"
Bandsaw; depth of gap	11¾"
Bandsaw; height of gap	7⅞"
Size of bandsaw table	19" x 19"

Also available in smaller sizes

• *Write today for full information and specifications.*

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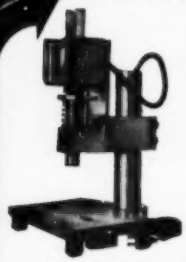

PRODUCES UP TO 10,000 PIECES PER HR.

This versatile low cost electric impact hammer produces up to 10,000 pieces per hour using automatic switching — as high as 5,000 pieces per hour with hand or foot switching. Ideal for steel stamping, inspection or identification marks on small defense parts.

ELECTROPUNCH is portable — plugs into any 115 V. A. C. outlet. Lightest model (illustrated) sells for only $90.75.

ELECTROPUNCH *quickly* pays for itself. Investigate its possible applications in your plant now!

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Dept. 3, 445 Watertown Street, Newton 58, Mass.

Phone: Frank Webster — Bigelow 4-6370

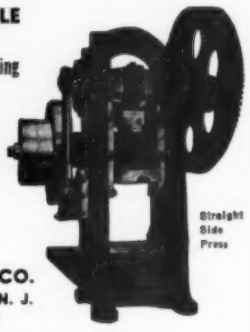
STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.



Straight Side Press

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There was a time when "hair-line" accuracy was industry's critical standard of measurement. Today, Tumico instruments divide and redivide that mythical "hair-line" many times.

Tumico precision measuring tools are being used by a large segment of American industry. We cordially invite your inquiries on how to solve standard and special production measuring problems.

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Tool life greatly increased by reconditioning cutting oil *with*
BARRETT OIL EXTRACTION SYSTEMS

Reports from plants using Barrett Oil Recovery and Reconditioning Systems show surprisingly high percentages in increased tool life. Then, too, users are enthusiastic as to the improved condition of the reclaimed oil as well as the high returns on the investment. Some set-ups in plants engaged on defense production have paid for themselves in a few months.

The Barrett Centrifugal Oil Extractor—which is part of a complete system—recovers 100% of the removable oil or 98½% of the contained oil from chips and turnings in 2 minutes or less. Complete Barrett oil recovery and reconditioning systems include Extraction, Sterilization and Sedimentation, together with filtration. The units involved are available in various sizes, individually or as a group, and are available with full manual control, semi-automatic control or with full automatic control requiring only loading, unloading, starting and stopping of the extractor by the operator. Complete plans including storage tanks for reclaimed oil or for use in conjunction with existing equipment are also available.

With the Barrett system, abrasive-free oil assuring longer tool life can always be depended on. With Barrett Sterilization and Sedimentation equipment, cutting oil is also safe and free from contamination.

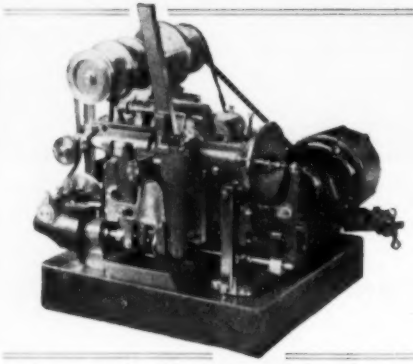
Investigate Today by Sending for Descriptive Bulletin of Oil Recovery and Reconditioning Systems

Barrett Centrifugal Oil Extractor — the heart of Barrett Cutting Oil Recovery and Reconditioning Systems.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

WALTHAM
PINION AND GEAR CUTTING MACHINES



Fast, Convenient, Compact, Accurate

Designed to make high speed production of small gears and pinions available for assembly in watches, instruments, gauges, fuses, etc. Made in Single-Cut, Multiple Cut and Magazine-Feed types. Simple to operate; require no special skill.

Send for detailed information and complete specifications.

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A SPECIALIZED CAM MILLING SERVICE . . JIG BORING SPOT WELDING . . CONTRACT PRODUCTION . . EXPERIMENTAL DEVELOPMENT

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Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY

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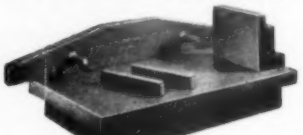

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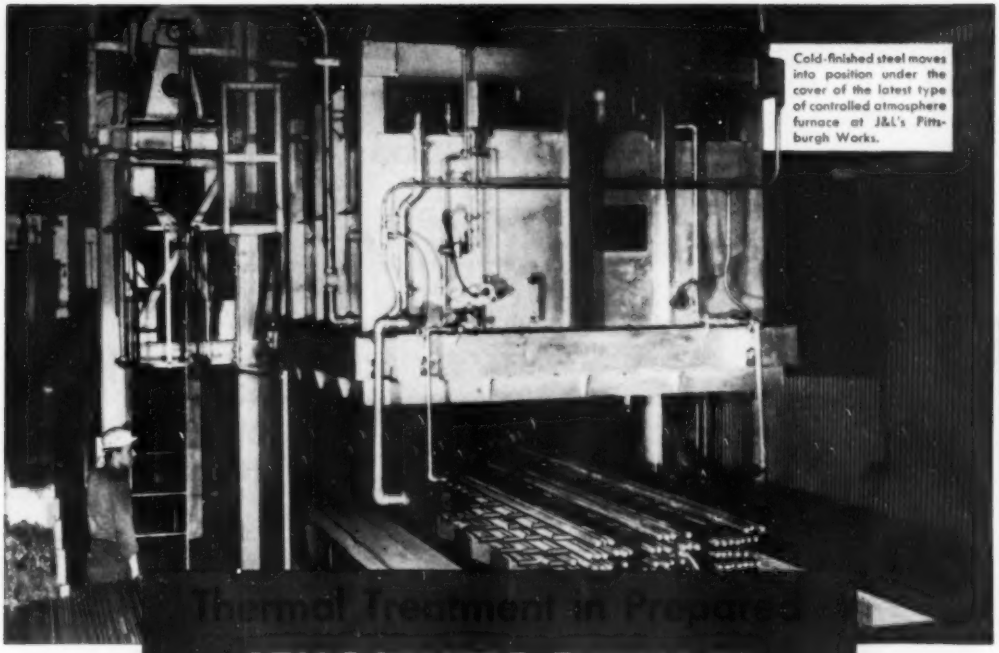
Let J&L CARBON RESTORED Cold Finished Bars cut your production costs



Cold-finished steel moves into position under the cover of the latest type of controlled atmosphere furnace at J&L's Pittsburgh Works.

ATMOSPHERE FURNACE

Why incur the cost of removing "decarbed" surface from parts requiring high surface hardness? To eliminate these costs and lower your unit production cost, simply order J&L Cold-Finished Carbon Restored Bars.

This furnace is designed to permit other thermal treatments, such as annealing, normalizing, stress relieving and strain drawing. These treatments can be employed to improve machinability or to meet desired mechanical properties.

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J&L STEEL

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☐ Without obligation please send me your booklet "Extra Services to Users of Cold Finished Steel."
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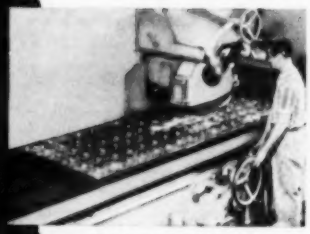
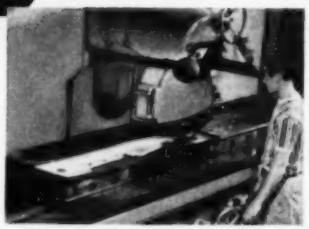


Grinding a load of 102 gears.

Use Sundstrand Magnetic Chucks

Here's another interesting application of magnetic holding applied to a surface grinder. The deep penetrating power of the Sundstrand magnetic chucks makes it possible to hold a great number of small parts or large castings. In all cases setup is simplified and clamping time is greatly reduced.

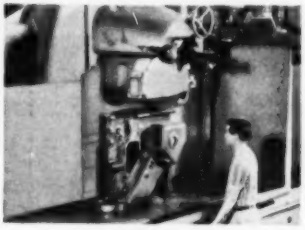
Whether you have tool room, production, or special holding problems, look into the possibilities of eliminating expensive clamping and increasing production with Sundstrand Magnetic Chucks.



Grinding four slide castings.

Get All the Facts

Write for complete information on these time saving magnetic chucks. Ask for bulletin 123M.



Grinding drill press frame

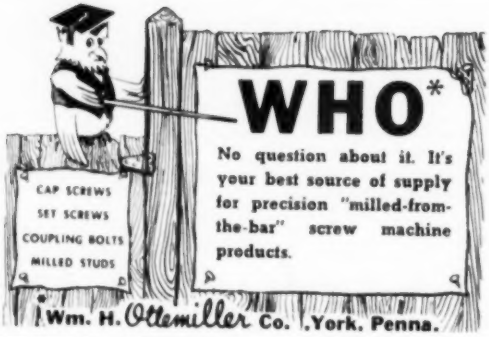
SUNDSTRAND MAGNETIC POWER-GRIP

SUNDSTRAND

Magnetic Products Co.

Division of Sundstrand Machine Tool Co.

1050 9th ST. • ROCKFORD, ILLINOIS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HYDRAULIC

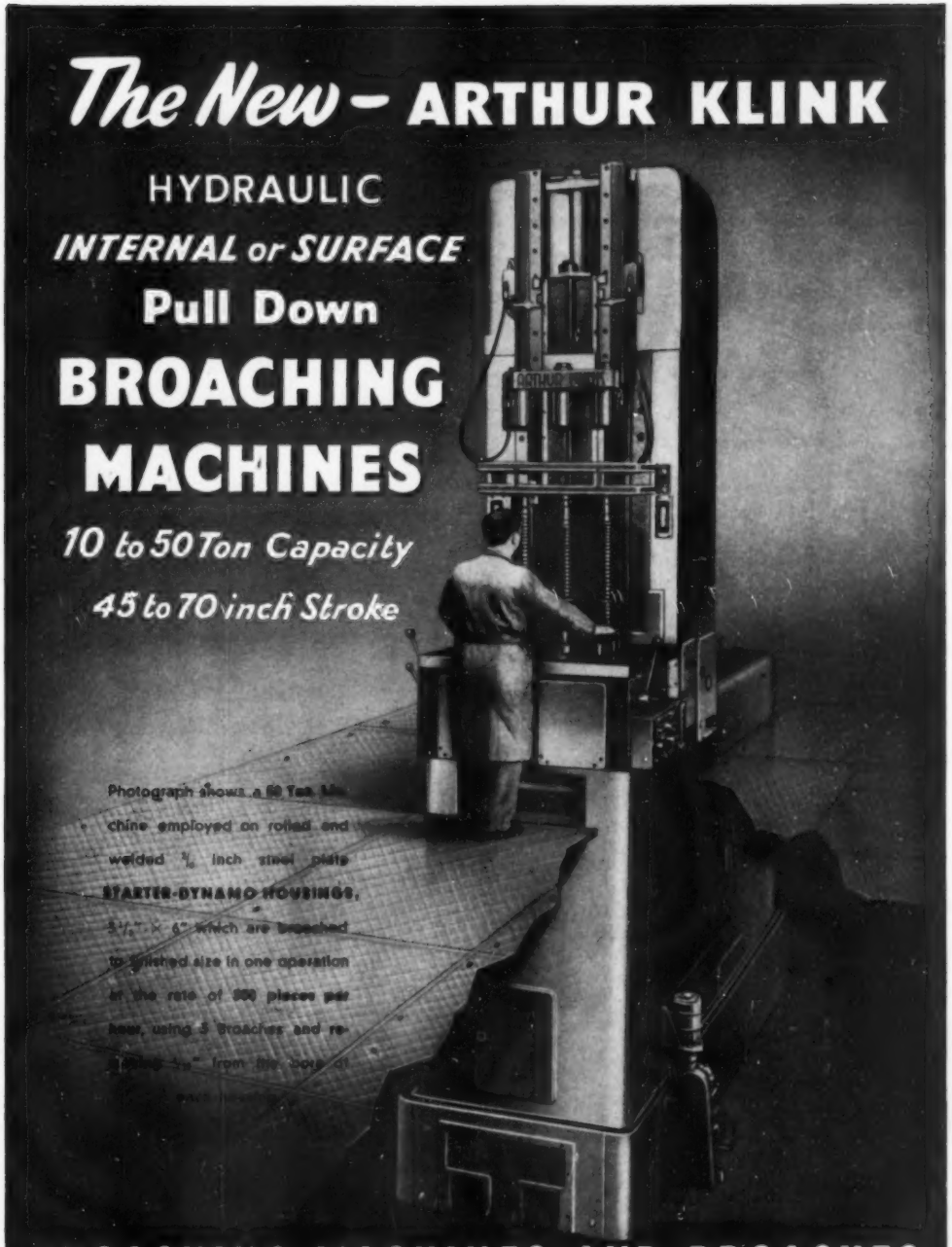
INTERNAL or SURFACE

Pull Down

BROACHING MACHINES

10 to 50 Ton Capacity

45 to 70 inch Stroke



Photograph shows a 50 Ton Machine employed on rolled and welded ⅜ inch steel plate STARTER-DYNAMO HOUSINGS, 5½" × 6" which are broached to finished size in one operation at the rate of 500 pieces per hour, using 5 Broaches and removing ¼" from the bore of the part in one pass.

BROACHING MACHINES AND BROACHES

ARTHUR KLINK G.M.B.H. NIEFERN BADEN - GERMANY

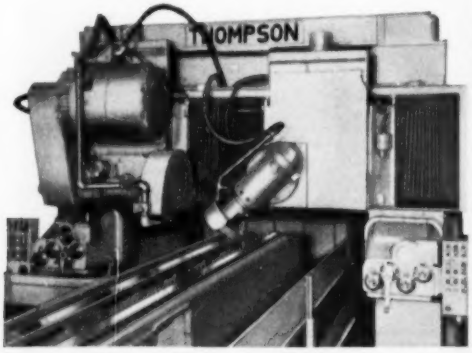
We are awaiting you at the 2nd European Machine Tool Exhibition in Hanover in the time from 14 to 23 September 1952, Hall I, stand 1109

New Thompson Way Grinder Developments

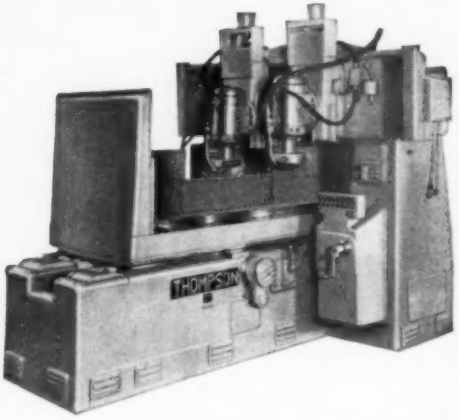
Reduce Costs ... Speed Machine Tool Production

Way Grinders now available with single, multiple heads, or combinations of horizontal and vertical heads and in sizes to meet all requirements.

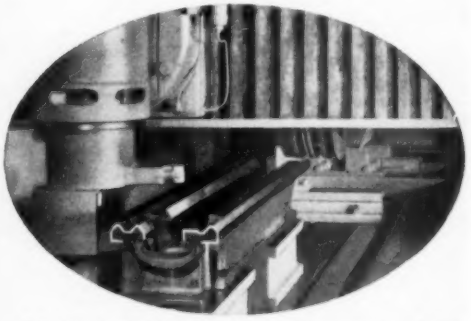
Thompson has produced machine tool way grinders in many types and sizes that have eliminated hand-work and produced economical and accurate ground ways. However, recently increased production grinding of ways has been made possible by many new Thompson Way grinding developments such as: automatic grinding and truing cycles; dual vertical or horizontal heads for grinding ways different heights; horizontal multi-wheel grinding and vertical side and undercutting head; Hydrail way grinding for giant columns or bed ways. Three of the new Thompson Way Grinders are shown here.



Designed especially for extremely large machine tool way grinding is this typical Thompson Hydrail Way Grinder. Size 48" x 48" x 192". Part: grinder bed ways.



One of several new Thompson Double Head Dovetail Way Grinders installed to speed work and hold accuracy in the plant of a leading lathe manufacturer.



Multi-wheel grinding with auxiliary vertical head. Equipped with horizontal spindle having dual spaced wheels and auxiliary inclinable spindle. The front contoured grinding wheel grinds the rear set of ways and the rear grinding wheel grinds the front set, with vertical head grinding the sides and undersurface of the ways and rack seat.

Write for details Today.

The Thompson Grinder Company, Springfield, Ohio

Thompson SURFACE Grinders

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These *Free* booklets give the facts on ABRASIVE-BELT GRINDING

"Abrasive-Belt Finishing"—Explains how abrasive-belt machining provides low-cost, rapid finishing of flat and irregular shaped surfaces. Discusses: (a) grinding of work requiring close dimensional accuracy; (b) contact-roll grinding on metals of various hardness; (c) grinding of irregular contours; (d) selection of abrasive belts.

"Case Histories"—Thirty-six representative examples showing how abrasive-belt machining upped output and slashed costs on many different materials and parts (aluminum, steel, iron, plastics, etc.) in a wide range of industries. Gives factual "before and after" data—compares costs—cites actual savings in time.

Catalog—PORTER-CABLE Abrasive-Belt Machines—Specifies type of machine best suited to speed production in factory, job shop and tool room on all these operations: close tolerance grinding on flats—squaring—cylindrical surfacing—contour grinding—deburring—beveling and chamfering—forming radii—smoothing parting lines, flashings, welds—polishing.

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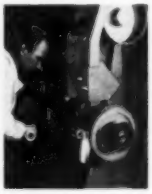
mail coupon today!



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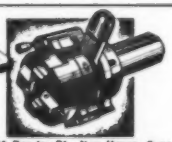

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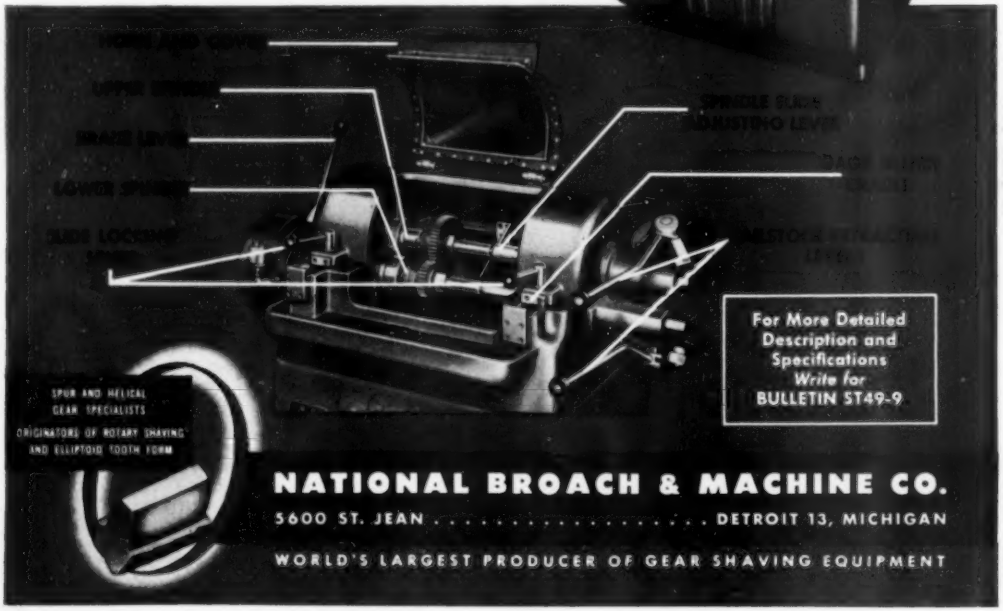

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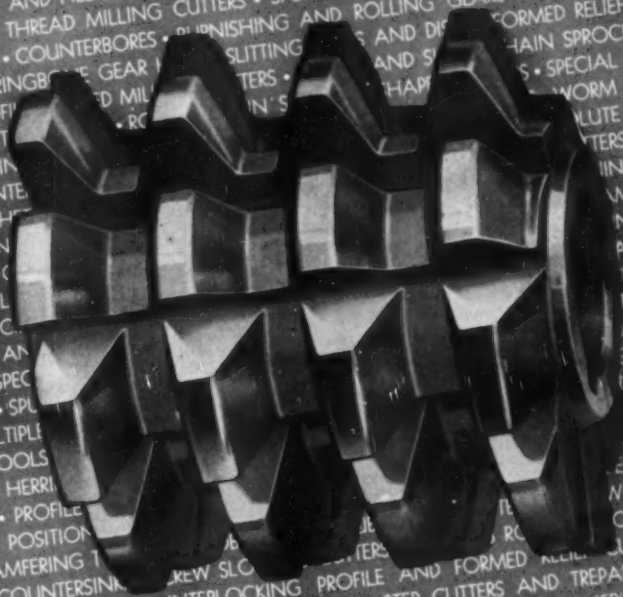

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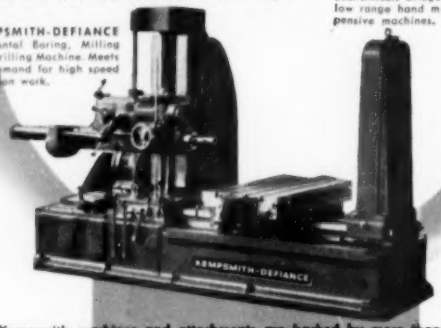

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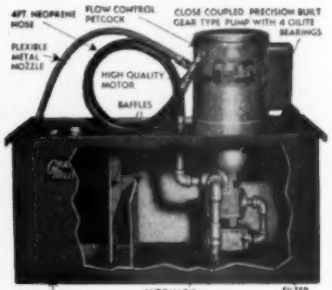

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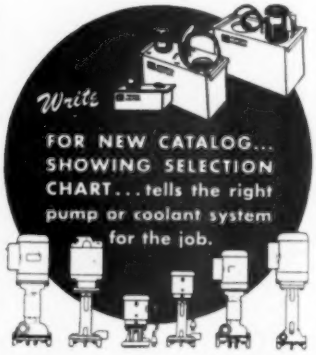

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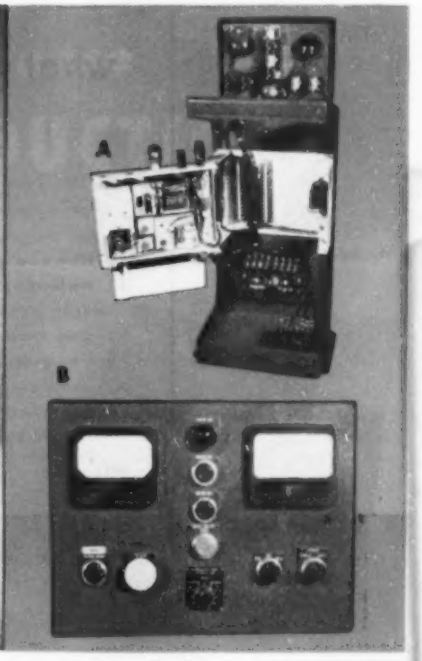

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This rear view shows the control with side and back panels removed, instrument panel hinged upward, and the cover of interior electronic drive units swung open. In three minutes the entire assembly can be made 100% accessible.

B—11 Remote Controls and Instruments
This close-up view shows the completeness of the remote control system on the new Minster Pulpit Control. Instruments include main motor control push button and starter . . . selector switches . . . tachometer indicator . . . ampere indicator . . . press start and top stop push buttons . . . speed adjustment potentiometer for variable speed drive.

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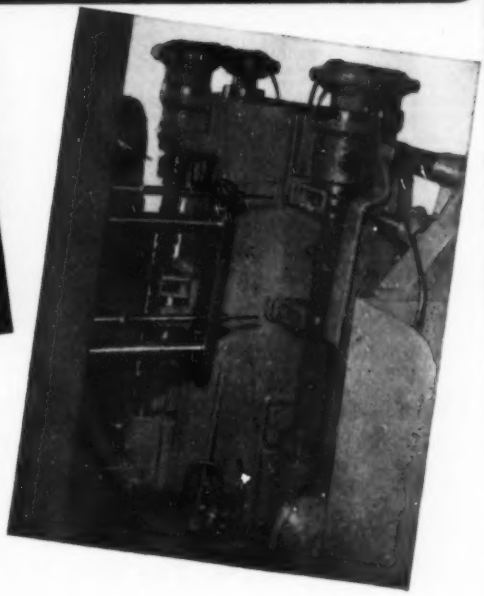

Above, four automotive connecting rods have both sides of crankshaft bore chamfered simultaneously. At right is shown one machine drilling four oil holes for camshaft journals and milling keyway for timing gear on automotive camshaft. Both machines illustrated utilize automatic clamping.

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BLAKE EQUIPMENT IS DESIGNED FOR PRECISION! Photograph shows construction of crank shaft unit of chamfer grinder workhead which helps make precision sharpening possible.

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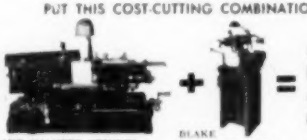

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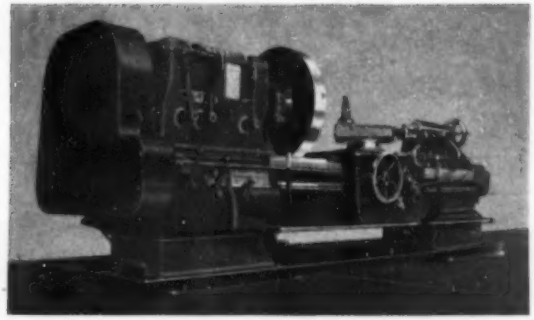

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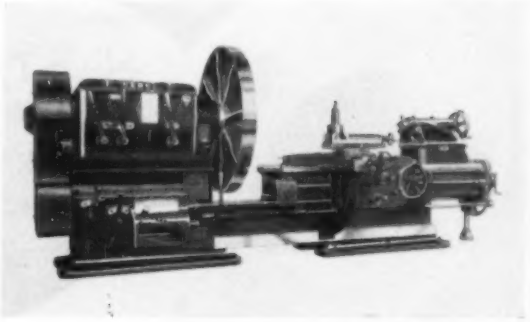

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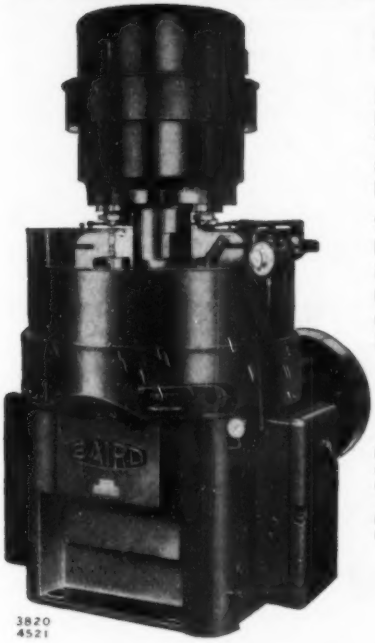

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Left: Front view, showing splash guards for wet cutting.

Right: A close-up view of typical tooling set-up.

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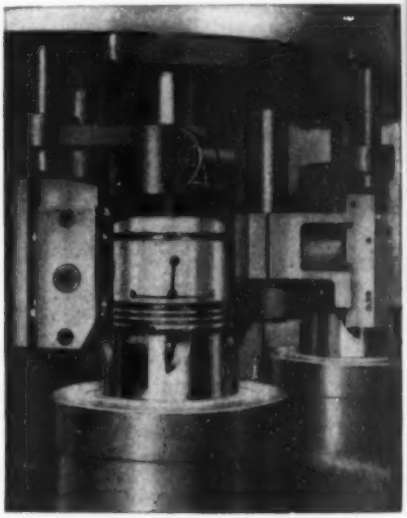

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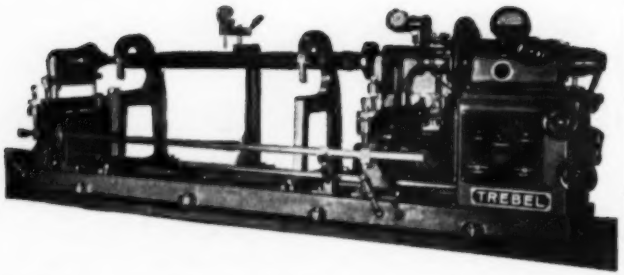

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BE suspicious of any figures you hear, and of most of those you see. If they don't correspond immediately to your previous experience, check 'em before you quote or use 'em. The urge to make numbers bigger, or smaller than anything previously reported is overpowering to some people; don't be victimized.

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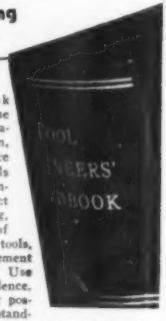

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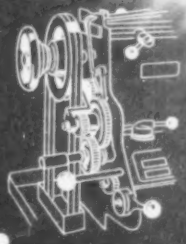
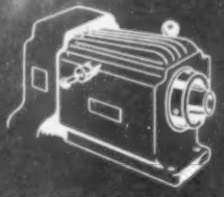


OUTBOARD DRIVE



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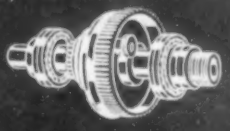
ASA-L-00 TAPERED KEY DRIVE SPINDLE



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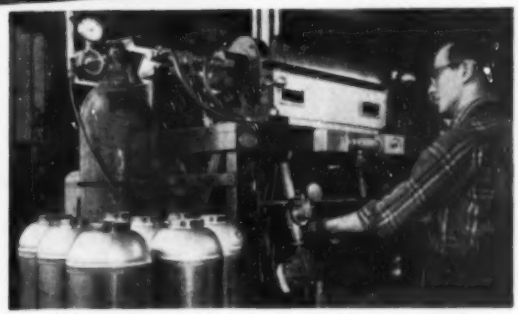

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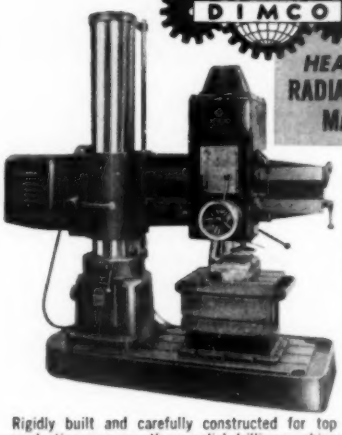

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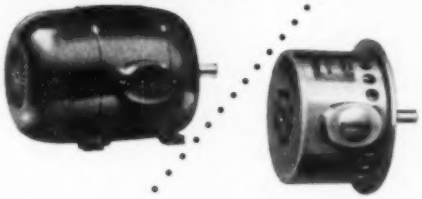

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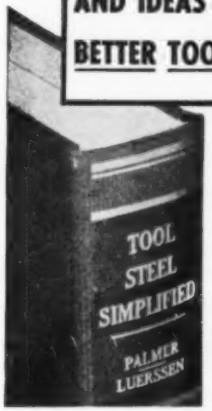

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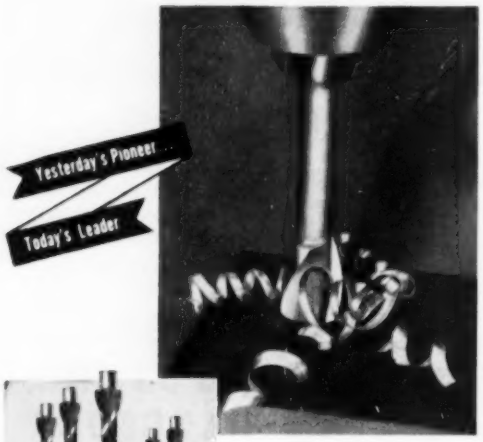

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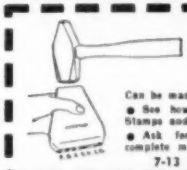

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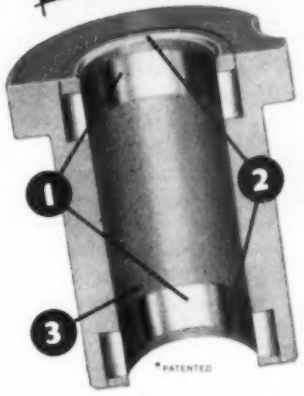

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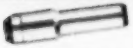

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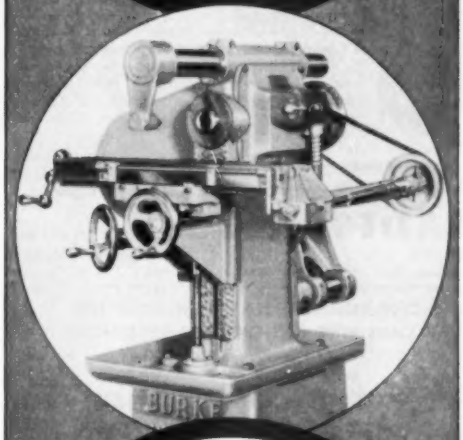

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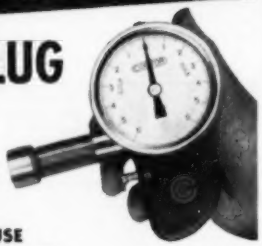

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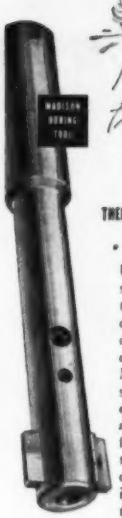

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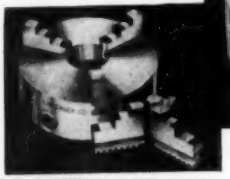

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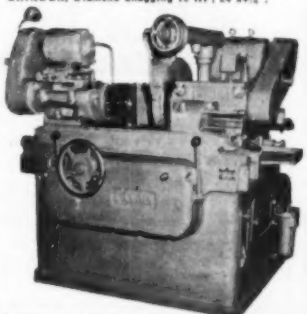

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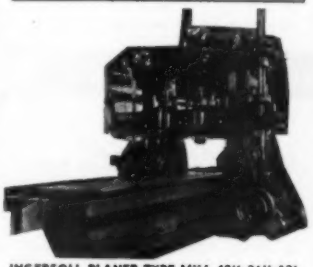

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MONEY BACK GUARANTEE

PRESSES

50 ton Warco OBI, air clutch
No. 56½ Toledo straight side
No. 77½ Bliss S.S. trimming
No. 245½ Hamilton straight side
36", 88 ton Cleveland dbl. cr., hydr. clutch
Nos. 92½D, 93½C & 94½E Toledo dbl. cr.
600 ton No. 570 Toledo forging, air clutch
650 ton Hamilton forging
400 ton Ferracute EG54 coining
650 ton, No. 8411 Hamilton double action toggle, hydr. clutch

SHAPERS & PLANERS

16" Smith & Mills shaper
24" Stockbridge shaper
24" Niles traveling head shaper
26" Smith & Mills shaper
27" Morton draw cut shaper
32" Ohio Dreadnought shaper
28"x28"x8' Gray planer
36"x36"x8' Cleveland O.S. planer
36"x36"x8' American planer
36"x36"x12' Niles B.P. planer
48"x48"x12' Gray planer

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MILES MACHINERY COMPANY

2025 E. GENESEE AVE. • SAGINAW, MICHIGAN

Phone Saginaw 2-3105

Add These Botwinik Values to your Plant Production!

BORING MILLS—Horizontal

FOSDICK #8—table type—3½" bar—outboard support—V-bolt M.D.
LANDIS #40 Floor Type—4" bar—outboard support—54" vert. traverse—motor driven.

BORING MILLS—Vertical

BULLARD 42" and 54" Spiral Drive—side heads—4-Jaw chuck tables—M.D.
NILES 53"—42" under cross rails—36" under tool holders—2 swivel heads—motor driven.
BETTS 8'—swing 100"—2 swivel heads—60" under cross rail—M.D.
CINCINNATI 10'—2 swivel heads—Massive Type—174" swing—M.D.
BULLARD Model J-11 Mult-Au-Matic—lead screw type—double indexing—considerable tooling—late type—M.D.

RADIAL DRILLS

FOSDICK 5'14"—box table—tumbler gear box—M.D.
CINCINNATI-BICKFORD 7'22" Master Type—box table—straight base—24 speed head—AC M.D.

GRINDERS

NORTON 10"x18" Type "C" Plain Mechanical—center grinding attachment—M.D.—1949 machine
LANDIS 14"x36" and 14"x72" Universal—3 motor drives—late types.
CINCINNATI 6"x30" Plain Hydraulic—Saddle Type—Hydatic bearings—M.D.—late type.
HEALD #25A Rotary Surface—30" chuck—24" swing—M.D.—late type.
CINCINNATI #3 Centerless—ball bearings—cap. to 6" dia.—M.D.
CINCINNATI #2 Centerless—Hydatic bearings—through feed—work rest—hydraulic wheel dresser—M.D.—1941 machine.

LATHES

HENDEY 14"x30" Ctrs. Geared Head—taper attch.—motor-in-base—late type.
REED-PRENTICE 10"x8' Geared Head—taper attch.—motor-in-base—late type.
LODGE & SHIPLEY 24"x12' Geared Head—taper attch.—threading dial—M.D.
BETTS-BRIDGEFORD 36"x30' Geared Head—21'7" Ctrs.—M.D.
CINCINNATI-ACME 4½"x17" Universal Turret—Timken bearings—arranged bar and chucking—M.D.

SPECIALS

BERTSCH 1¾"x18' Pyramid Type Bending Roll—drop end—100 HP main and 30 HP adjusting motors—1944 machine—used very little.
BULLARD 30"x20" Man-Au-Trol Spacer Unit—table 19"x40"—positions 200 holes at one setting—hydraulic operation—very late type.

This is only a partial listing of our huge stock of Machine Tools of every make and description.

Send for our free catalog "The Plant That Answers 1001 Machine Tool Problems".

Botwinik Brothers of Mass. Inc

MODERN MACHINES

Gould & Eberhardt Automatic Gear Hobber Serial #3234, Model 90H—90"
#84 Fellows Gear Shaper, Ser. #28133
#8A Fellows Gear Shaper, Ser. #25804
6' American Radial Drill Ser. #55392
Lodge & Shipley Lathe #29861 18" Jaw Chuck
Reed Prentice Engine Lathe
60" Hanchett Face Grinder
6D Potter & Johnson Automatic Chucking Machine
#30 Waterbury Farrell Thread Rollers
10" Gould & Eberhardt Shaper
(2) #3 Cincinnati Miller-Ser. A1004 B
3' Reed Prentice Radial Drill Serial #5121
Gearad Pin Router—Serial #2525
Rowbottom Cam Miller and Motor
#32 Lucas Precision Horizontal Boring Mill Serial #32-16-21

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St., Providence, R. I.

OUTSTANDING MACHINE TOOLS

AUTOMATIC SCREW MACHINES
GYROMATIC Model 40 15/8" 6 spindle. Late
CLEVELAND 3¼ Model A; Late Type.

BORING MILLS—Horizontal
FRANKLIN 4½" Bar; table type; M.D.
LANDIS #40, 4" Bar; floor type; M.D.
LANDIS #35 floor type; 3½" bar; M.D.
LUCAS 41", table 24"x48"; M.D. Late
NILES 8" bar floor type, motor drive.
UNIVERSAL 3" Bar, table 40"x58", M.D. Late

BORING MILLS—Vertical
BETTS 120" 2 heads P.R.T.; M.D.
BULLARD 8", 16" 6-spindle "A" Mult-au-matic
COLBURN 72", 2 heads PRT. M.D.
NILES 100", 2 swivel heads; motor drive.
NILES 53", 2 swivel heads, motor drive.

BRAKES & SHEARS
BESCO 14 gauge 60" Press Brake; NEW.
BESCO 14 gauge 72" Press Brake; NEW.
BESCO 36"", 20 gauge Power Sq. Shear; NEW.
BESCO 48", ¼" gauge Power Sq. Shear; NEW.
BESCO 48", 16 gauge Power Sq. Shear; NEW.
BESCO 48", 14 gauge Power Sq. Shear; NEW.
BESCO 72", 14 gauge Power Sq. Shear; NEW.
BESCO 96"x¼" Power Sq. Shear; NEW.
BESCO 96"x½" Power Sq. Shear; NEW.
CHAMBERSBURG 500 HP, Billet Breaker; late type.
JAMES RENNIE No. 8, Univ. Ironworker; late type.
NIAGARA No. 116 Squaring Shears; late type.
QUICKWORK No. 5 ½" rotary, M.D.
QUICKWORK No. 6, 1" capacity; motor drive.
WORMSER T-15; T-25; Univ. Ironworker; NEW.

BROACHES
CINCINNATI 1-30 Duplex Vert. Hydr.
COLONIAL V.G. 1-10-48; Vert. Hydr. late.
OILGEAR 3XA Horizontal Int.; Late.

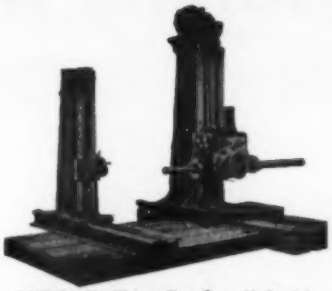
DRILLS—Radial
CINCINNATI BICKFORD 6'15" Univ.; M.D.
KITCHEN & WADE 3' arm 12" col. M.D.

DRILLS—Miscellaneous
AVEY No. 3, Ball bearing, Motor drive.
BAKER No. 217; Late.
BARNES No. 420 Deep Hole; late.
BARNES H-3 Hydram; hydr.; inverted; late.
BARNES H-2 Hydram; hydr.; M.D.
BARNES 20" 4-spindle Camel Back, Late.
BODINE #42-20 multi-univ., dial feed; M.D.
CINCINNATI 21", late.
FOOTE-BURT, 6-spindle, late type.
LeBLOND No. 2, deep hole, late type.
LEMAIRE, 6spindle, late type.
MOLINE 6-spindle Hole-Hog 3¼"; M.D.
NATCO No. 14 Mult.; Rect. Hd.; PRT; M.D.

GEAR CUTTING EQUIPMENT
BILGRAM 6" & 16" Bevel Gear Cutter, M.D.
BROWN & SHARPE 6-72" Auto. Cutter; M.D.
CROSS #1, #40, #45 Tooth Rounders; M.D.
DETROIT type GG-36 Gear Grinder; late type.
FELLOWS No. 4 Enveloping Gear Gen., M.D.
FELLOWS Nos. 61A, 62, 75, 7, 7A, 72, 77 High Speed Gear Shapers; late.
FELLOWS 13-LS Lapper; late.
GLEASON #20 Tester Late Type.
GLEASON 25" straight dbl. gear gen.; M.D.
GLEASON #11 bevel cutter-grdr; M.D. late
GLEASON 18" bev. gear Tester & Lapper; M.D.
GLEASON #6 Revacycle. Late type.
GLEASON No. 12 Tool Sharpener; late.
GLEASON 12" Straight Bevel Gen.; late.
GLEASON #4 & #6 Tester, Late Type.
GLEASON 10", 11" & 18" Bevel Gear gen.
GLEASON 24", 37", 77", 96" Bev. Gear Planer
GLEASON No. 14 Hypoid Grinder; late.
MICHIGAN Gear Finisher, Model 862-24-A, 24" cap. Late Type.
PRATT & WHITNEY 10" Gear Grinder; late.

GEAR HOBBERS
BARBER COLMAN 12# Motor Drive.
BARBER COLMAN Type A; Late.
GOULD & EBERHARDT #8H; Late.
GOULD & EBERHARDT #16H, Motor Drive.
GOULD & EBERHARDT #36 H; Late.
GOULD & EBERHARDT #36BM 3 spindle Auto. Rougher; M.D.
KORFFER WM-11 Auto.; bench type; Late.
PFAUTER RS1; Max. dia. 30" late.

GRINDERS—Plain Cyl. & Univ.
BROWN & SHARPE #5 Pl. Cyl.; late.
CINCINNATI 14x72 Model EM Plain, Late.



LANDIS #40, 4" bar, Floor Type, Horizontal Boring, Milling and Drilling Machine.

LANDIS 16x36" Type C Plain, Hydr. Late type.
LANDIS 10x36" Type C Plain, Hydr. Late type.
LANDIS 10x18" Type C; late type.
LANDIS 4"x12" Type H, Plain; Late.
LANDIS 20"x240" Plain cyl., M.D.
NORTON 10x72; type C; plain; M.D.
NORTON 10x120; plain; M.D.
NORTON 14x50" plain; late.

GRINDERS—Surface
ARTER 8" Rotary, M.L.
BILLITTER & KLUNZ 48"x196" Way Grinder.
BLANCHARD #16 Hi Power Vertical; Late.
HEALD #22 Rotary, 12" chuck; m.d. Late.
PRATT & WHITNEY 14x36" Model B, Late.
THOMPSON 2V Special; late type.

GRINDERS—Miscellaneous
BRYANT No. 3 Internal; hydraulic; late.
BRYANT No. 5 Internal; hydraulic; late.
BRYANT No. 16-C-16 Internal; hydraulic; late.
BRYANT No. 16-CP-16 Internal; hyd.; late.
BRYANT No. 24 Internal; hydraulic; late.
EXCELLO #48 Carbide Late.
HEALD 75A, special internal; late type.
HEALD No. 72A-5 "Gagematic" Int.; Late.
HEALD No. 72-A-3 "Gagematic" Int.; Late.
HEALD 72-A-3, 72-A-5 Plain; motor drive.
HEALD No. 76 Internal Centerless; M.D.
LEMPCO 22x72" Mod. KG Crankshaft; Late.
VAN NORMAN 666 Crankshaft Regrind.
VAN NORMAN 639 Osc. type Radius; Late.

HEADS AND UPSETTERS
ACME 2" Model XN, late type.
AJAX 3½" Upsetter, motor drive.
MANVILLE #3 DSOD, Motor Drive.
MANVILLE #2 DSOD, Motor Drive.
MANVILLE #1A DSSD, Motor Drive.
WATERBURY FARREL #11, DSSD, M.D.

LATHES—Engine & Mfg.
AMERICAN 86x32" centers geared heavy.
DENHAM 16x48" centers, Gap; late type.
DENHAM 12x54" centers, Gap; late type.
DENHAM 16x72" centers, Gap; late type.
GRAHAM NORMANTON 12"x48" centers; late.
HENDEY 12"x54" centers, belted motor drive.
JONES & LAMSON "FAY" 20x25" Auto. Late.
LEHMANN 16"x30" Hydratrol; late type.
LEHMANN 25x96" center; Timken; grd. M.D.
LeBLOND 16x36" center; Auto.; Timken; late.
LeBlond Mod. 7ACL Crankshaft; M.D.
LODGE & SHIPLEY 14"x30" Centers, late type.
LODGE & SHIPLEY 16"x30" Centers, late type.
LODGE & SHIPLEY 24"x96" centers; Late.
LODGE & SHIPLEY No. 5—24" and 96" centers DUOMATIC Timken; Late.
LoSWING 4x60", 8x24", 8x108"; late.
MONARCH 14"x42" type Z, Magnamatic; late.
NILES 30"x46', 30"x50' Boring; "Time-Saver"; Timken; Late.
PORTER CABLE 9x14" High Speed; Late.
PORTER-McLEOD 16"x6'; NEW.
PORTER-McLEOD 16"x8'; NEW.
PRATT & WHITNEY 16"x30", Timken; late.
REED-PRENTICE 14"x54", Timken; late type.
SPRINGFIELD 16"x30" Centers, Timken; late.
SPRINGFIELD 14'x42", geared; M.D.
SUNDSTRAND 10x60" Auto. Late Type.
SWIFT 16"x72" Centers; M.D. Late.
SWIFT 20"x120" Centers; late.

LATHES—Turret
MOREY No. 2 ram type TIMKEN.
GISHOLT 1L, Saddle type, M.D.
MAGDENBERG Model MWF-BG-250 Univ. table type; P.R.T.; 12" hole through spindle; cross sliding turret; M.D.; Late.
WARNER & SWASEY 4-A, Timken Bearing, 7½" Bore, motor drive.

MILLING MACHINES—Pl. & Univ.
BROWN & SHARPE #2B Timken M.D.
CINCINNATI #2 Plain, hi power Timken; M.D.
KEMPSMITH #2 Timken; Univ. M.D.
CINCINNATI 4-48,4 spindle, Tracer; Late.
ROCKFORD Rigid-Mill #3 M.D.
STARR No. 2, table 18"x56"; late.
RICHMOND #2, light, late type.

MILLING MACHINES—Mfg.
CINCINNATI O-6 vertical; late.
GOULD & EBERHARDT 25 Cont. type; M.D.
INGERSOLL 32x24x16' Planer Type; 2 hds.
INGERSOLL 30x24x12' Adj. Rail Slab; M.D.
SUNDSTRAND Mod. 3A Duplex 42" feed, M.D.
TAYLOR & FENN M-80 Duplex Spline; Late.

MILLING MACHINES—Thread
HALL Style D Planetary, Late Type.
LEES BRADNER HT 12"x24", M.D.; Late.
LEES BRADNER HT 12"x36", M.D.; Late.
MOREY 12x30" centers, 12x120" centers, late.
PRATT & WHITNEY 4½x12 Mod. C; late.

PLANERS
BETTS CONSOLIDATED 108"x84"x44', 4 heads; PRT; Box Table; M.D.
GRAY 24x24x8'; motor drive.
GRAY 36"x36"x10', 4 heads, PRT; Late.
LIBERTY 144"x16"x48" adj. variable, openside, box table; 4 heads, PRT; M.D.
NILES 108"x84"x45', 4 heads; Rapid Traverse; Box Table DC; M.D.
NILES-BEMENT-POND 72"x72"x30', 4 heads; Rapid Traverse; M.D.
NILES-BEMENT-POND 60"x60"x12', Rapid Traverse, 2 swivel heads, box table, M.D.

SAWS
CAMPBELL #401 Abrasive cut-off, Late.
ESPEN LUCAS No. 670 60" cap. Hydr.; Late.
GROB OS-20 metal band saw & filer; Late.
HELLER Model SS-1, 6¾ Cap Cold Saw.

SHAPERS—Slotters
DILL 18" Slotter; motor drive.
PRATT & WHITNEY 6" Vertical; M.D.
PRATT & WHITNEY M 1281 10" Vert., M.D.
LYND FARQUHAR 26" Openside; M.D.
NEWTON 15" Slotter; M.D.
ROCKFORD 20" Vertical, Hydr.; Late Type.
ROCKFORD 24" Hydraulic; Late Type.

PRESSES
BESCO ER 2 Power Punching; NEW.
BESCO EB 3 back flywheel; NEW.
BESCO B-4; back flywheel; NEW.
BESCO No. 18, 10-ton OBI; NEW.
BESCO Mod. 21 Incl. 40 ton, 8" stroke; NEW.
BIRDSBORO 326 ton Vert. Hydr.; Late.
BLISS #6 SS DC 135 ton; 34"x95" bed; 2½" stroke; 60 SPM.
BLISS No. 410A Toggle Drawing; tie rod; steel gearing.
BLISS No. 3½A geared toggle; dble. acting.
GLEASON 15" Quenching; hydr.; M.D.
HANNIFIN 6-ton, 16-ton; hydr.; Late.
HANNIFIN 16-ton Hydraulic; late type.
NATIONAL #5 H.S. Maxi-Press (Forging).
SENTINEL 25-ton OBI; NEW.
SHORE, 500 ton Hydr. Flanging & Forging.
TOLEDO #93 Straight Side DC 113 ton; 33"x 104" bed; 2" stroke; 70 SPM.
WATERBURY Farrel 125 Ton; Bt. Side.

MISCELLANEOUS
BAKER #5 Keyseater; motor drive.
BARNES No. 172, 214 Honing; hydr.; Late.
BAUSCH #1 Radial tapper; late type.
CROSS #46 Tooth Gear Chamfering Machine.
FISCHER No. 1, Oil Groover; Late.
GROB OS-20 Metal Band Saw—Filer; M.D.
HUGH SMITH 1"x24'6" Plate bend. rolls M.D.
LeBLOND No. 2 Barrel Riffing Machine.
MANVILLE #2C Screw Slotter; Motor Drive.
MANVILLE #1 Screw Slotter; Motor Drive.
LANDIS 2" Dble. Spdle. Threaders; M.D.
LeBLOND #2 Barrel Lapper; M.D.; Late.
MICHIGAN #254 Gear Shaver; Late.
MANVILLE No. 2 Trimmers; Late.
MANVILLE No. 3C Thread Roller; M.D.
SAUNDERS 8-18" Pipe Machine; M.D.
US TOOL 310-B Cutter Reliever; Late.
WATERBURY FARREL No. 11 Thread Roller.
WEYBRIDGE Slitter; 36x22 gauge; NEW.

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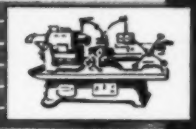

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SAFAK Planing Machine

48" x 30" x 13'

GREAT RIGIDITY WITH TOP PRECISION

IMMEDIATE DELIVERY FROM STOCK!

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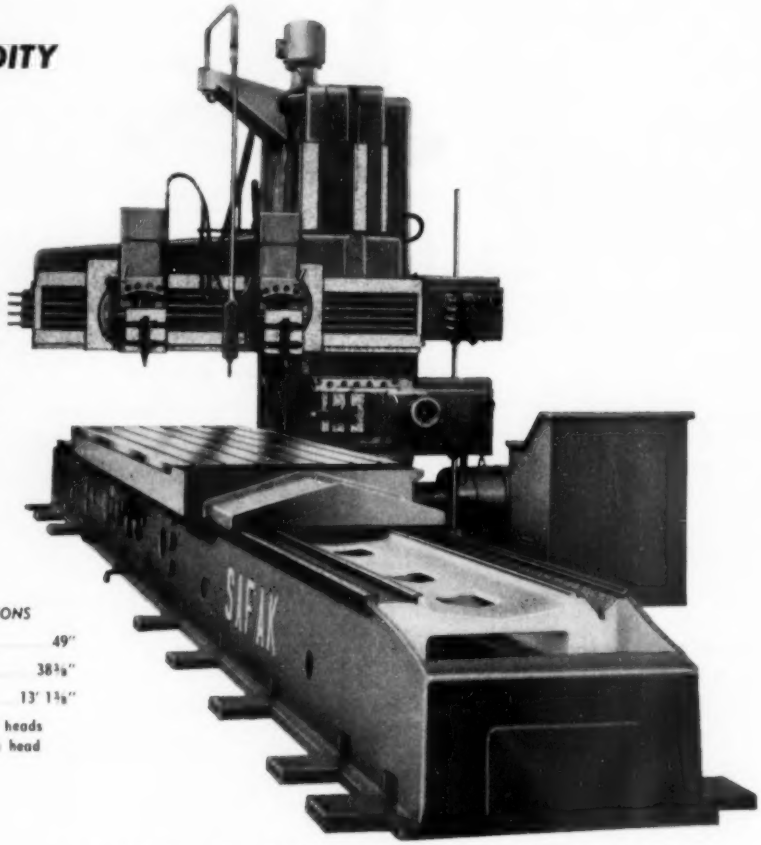

PARTIAL SPECIFICATIONS

Width	49"
Height under rail	38 3/8"
Stroke	13' 1 1/8"
Vari-voltage drive with 2 rail heads 1 side head	

Necessary strength, resistance and rigidity come from the heavy cast-iron bed and table braced by ribs and bolted by hard steel as further insurance against vibration or warping. Bakelite ways reduce the coefficient of friction and guarantee smooth operations.

There is forced feed lubrication to the ways, driven by an independent motor, and giving a constant and plentiful supply.

Operation of the SAFAK Planing Machine is simple and all controls are within easy reach of the operator, requiring a minimum of physical effort.

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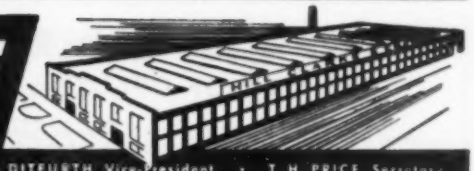

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AUTOMATICS

⅞" G Model Gridley
1-1/16" Model A Cleveland (1942)
1½" Foote Burt (1941)

DRILLS

1 Spdl—15" Sw—No. 2 Avey, Cam Fd.
1—Spdl—24" Sw—No. 2 MA6 Avey
2 Spdl—24" Sw—No. 2 Aveymatic
2 Spdl—24" Sw—No. 3 Avey
D-31 Fox Multiple Drill, No. 2 Taper.
6' Western Radial

GEAR MACHINES

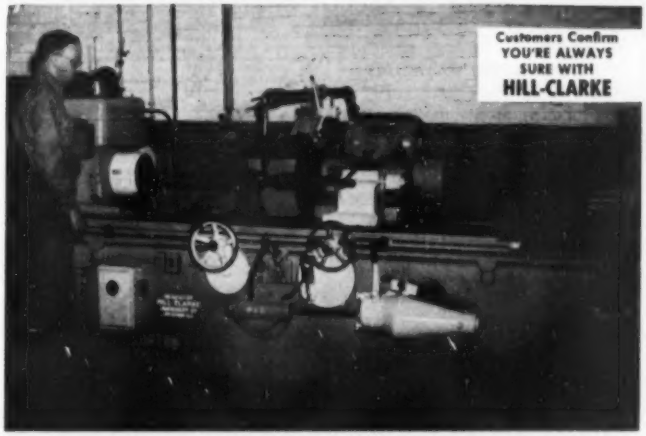
No. 12-H Gould & Eberhardt Hobber
No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl. Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.

BORING MACHINES

72" Niles—Hvy. Pattern

GRINDERS

6"x18" Norton Cylindrical (1943)
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x50" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
16"x120" centers
16"-40" gap x 120" centers
18"x96" centers



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18"-30" Gap x 96" centers
20"x96" centers
24"-32" Gap x 144" centers
No. A-3—12" Arter Rotary Surf.
5A Bryant Internal
5B Bryant Internal
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 71 Heald Centerless Internal
No. 81 Heald Int. Cen.-Sizematic
No. 74 Heald Internal Centerless
No. 44 Excello Carbide Tool Gdr.

LATHES

19"x8' LeBlond Hvy. Duty Lathe
36"x18' Putnam Grd. Hd., M.D.
No. 4 Warner & Swasey Tur.-Bar Fd.
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 4A Warner & Swasey—7⅛" Hole —Spdl.

MILLING MACHINES

6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Gray, 2 hds.
48"x48"x12' Cincinnati; 2 hds.
48"x48"x12' Gray Maxi-Service
48"x60"x27' American, 4 hds.

MISCELLANEOUS

2—12"x96" Magnetic Chucks
20'x1" cap Southwark Roll
14'x¾" cap Niles-B-Pond Roll
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
No. 0 Bakewell Tapper
No. 200 Micro. Horiz. Hone, 1 Spdl.

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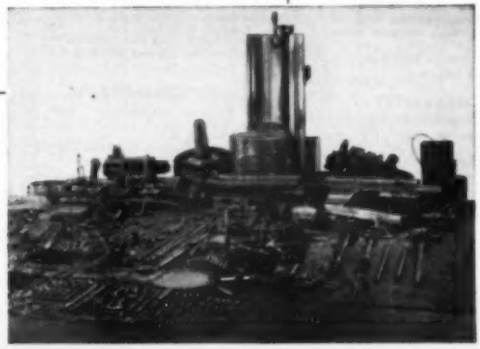

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5. A responsible organization —with eighty-five years experience.

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Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

SLOTTERS

10" Newton, m.d.
10" Newton, cone
12" Bement-Niles, m.d.
15" Canada, m.d.
18" Dill, m.d.
18" Niles-Bement, s.p.d.
18" Betts Crank Slotter, m.d.
20-24" Dill, m.d.
22" Betts, m.d.
48" Niles, m.d.

SHEET METAL MACHINERY

Gray Turret Head Metal Cutter, cap. ⅛", 36" throat
No. 2 Libert Nibbler, 29" throat
120" No. 100 Niagara Heavy Production Folder, 16 ga., m.d.
No. 3—3/8" cap. Gray Sheet Metal Cutter, m.d.
8' x ¼" cap. No. 108 Dreis & Krump Leaf Brake, m.d.
No. 330—cap. ⅜" W. J. Savage Co. Nibbler
8' x 14 gauge Bertsch Shear, s.p.d.
⅛" x 10' Cincinnati All Steel Shear, m.d.

TURRET LATHES & SCREW MACHINES

No. 00E Oster Geared Head Rapiduction, m.d. in leg, chucking
No. 1 Cincinnati-Acme Semi-Universal, m.d.
No. 1A Warner & Swasey, m.d.
No. 1L Gisholt, m.d., Timken
No. 2 Cincinnati-Acme Full Universal, m.d.
No. 2 Pratt & Whitney Shavers, m.d.
No. 2A Warner & Swasey, m.d., bar
No. 2F Foster Fastormatic, m.d., Timken
No. 3 Cincinnati-Acme Full Universal, m.d., chucking
No. 3 Foster Geared Head m.d., bar
No. 3B Foster Universal, m.d., bar
No. 3F Foster Fastormatic, m.d., Timken
No. 4 Warner & Swasey Plain, cone, bar and chucking types
No. 4A Warner & Swasey Universal, m.d., chucking
No. 4FU Foster Fastormatic, m.d., latest
No. 5 Foster Universal, m.d., bar, late type
No. 7 Gardner & Oliver, cone
No. Pratt & Whitney Hand Screw Machine, cone
2½x24", 3x36", 3½x32", 4x34" Jones & Lamson Geared Head, m.d., bar and chucking types
3½" Cincinnati-Acme Geared Head Flat Turret, chucking & bar types
18" Libby Type A, m.d., chucking
20" Acme, s.p.d., bar
20" Dreses,
28" Gisholt, cone
28" Libby Type C, m.d., chucking
No. 5 Woods Tilted Turret, Model D, cone

ARBOR PRESSES

No. 37E Wilson Hydraulic, hand operated, 50 tons, new
King Screw Press, s.p.d.
No. 5 Greenard Arbor Press, floor type, hand operated

AUTOMATICS

4 spindle 1¼" Conomatic, m.d., bar, 1942 machine
No. 6A Potter — Johnston, m.d.
No. 6C Potter — Johnston, m.d.
16" Fay Flanders Type, m.d.
4 spindle 2½" Cleveland Model "K", m.d.
2½" Gridley Single Spindle, m.d.
4½" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
7½" Cleveland Model A, m.d.
No. 8A Cleveland, m.d., 8" cap., latest
50 Potter — Johnston, m.d.

BOLT THREADERS

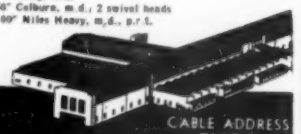
¾" Style R Economy Automatic Threading Machine, belt
Victor Nut Facing Machine, m.d., cap. ½" to 2" nuts
1" Landis Double Spindle, m.d. thru gear box
1½" Landis 2 spindle, late
1½" Landis 2 spindle, older type

HORIZONTAL BORING MILLS

#31 Lucas, m.d.
Barrett Double End, 5" and 7" spindles, m.d.
3½" bar Landis Floor Type, m.d.
4½" bar Niles Table Type, m.d.
5½" bar Niles, m.d.
10" bar Sellers, Floor Type, m.d.
Pair tables for use on Floor Type Horiz. Boring Mill, 8'9" long x 17½" wide x 36" high, 2 T slots
Pair tables for use on Floor Type Horiz. Boring Mill, 8' long x 15¾" wide x 33" high, 2 T slots
Floor Plate consisting of box type Planer Table, 21' long x 48" wide, 12" thick
54"x11' Rectangular Table, 40" high

VERTICAL BORING MILLS

24" Bullard New Era, m.d.
42" Bullard Spiral Drive, M.D.
42" King, m.d.
60" Colburn, m.d., 2 swivel heads
100" Niles Heavy, m.d., p.r.t.



WRITE FOR COMPLETE STOCK LIST

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

HEADLINERS

MILLING MACHINES

No. 2B Heavy Brown & Sharpe Plain
No. 3 Kempsmith & Universal, Lima Drive
No. 1A Brown & Sharpe Universal
No. 4 Cincinnati High Power Universal
No. 4B Heavy Brown & Sharpe Plain
48" Cincinnati Plain Automatic

LATHES

12"x84" centers American 12-speed Grd. Hd., taper
14"x30" ctrs Lodge & Shipley Selec. Grd. Hd.
16"x30" ctrs Lodge & Shipley Selec. Grd. Hd.
21"x136" ctrs LeBlond Hvy. Dty., Turner Drive, taper
24"x60" ctrs American Hvy. Pat. 12-speed Grd. Hd., taper
86"x96" centers Boye & Emmes, cone, taper

PLANERS

24"x24"x6' Gray, A.C. M.D.
30"x30"x8' Cincinnati, a.c. m.d.
42"x42"x14' Niles-Bement-Pond Hvy. Pat., box table, 4 heads
48"x48"x12' Niles-Bement-Pond, 4 heads
60"x60"x32' G.A. Gray, 4 heads, excellent

TURRET LATHES AND AUTOMATICS

1⅞" Cone 4-spindle Automatic, bar feed
3"x36" Jones & Lamson "Hartness" Turret, bar feed, lots tooling, clean

GRINDERS

20"x144" Landis Plain Self-cont., arr. m.d.
10"x24" Landis Plain Self-cont., m.d.
10"x24" Norton Plain, m.d.
No. 49—53" Besly Vert. Spdle. Surface, m.d.
No. 5A Bryant Hydraulic Internal, late
No. 2 Norton Motor Driven Universal Tool & Cutter
No. 14-20 Gardner Opposed Type Disc
No. 33 Abrasive Surface, m.d.

GEAR MACHINERY

#3-36 Brown & Sharpe, A.C. M.D.
No. 1 Adams Hobber, arr. m.d.
No. 2 Barber-Colman Hobber, m.d.
No. 5A Cincinnati 60"x16" Cutter
No. 12 Barber-Colman Hobber, m.d.
11" Gleason Str. Tooth Bevel Gear Generator
No. 18HM Gould & Eberhardt Double Spindle Hobber, s.p.d.
18" Gleason Str. Tooth Bevel Gear Gen. s.p.d.
18" Gleason Bevel Gear Tester
No. 7 Fellows High Speed Shaper, m.d.
No. 61 Fellows Gear Shaper, m.d.
12" Gleason Bevel Gear Planer, cone

RADIAL DRILLS

6'-15" col. Cincinnati-Bickford, m.d.
6'-16" col. American "Triple Purpose", m.d.
7'-17" col. Dreses, m.d.

PUNCH PRESSES

No. 2 VKV, O.B.I.
No. A4 Robinson O.B.I., m.d., 56-tons
No. 77 Toledo Open Back, b.d.
No. 2DT CANCO Deep Thrt. Horning m.d.
No. 5H Cleveland Horning, arr. m.d.

MISCELLANEOUS

7"x7" Peerless "Mechoni-Cut" Hack Saw, late
10" Dill Slotter, m.d.
20", 24", 28" Gould & Eberhardt Shapers
No. 14½ W&W Punch & Shear
Class F Bertsch Punch & Shear
2½"-6" Cox Pipe Machine, m.d.
1½" Landis 2-spdl. Bolt Thrd., m.d.
2½" Landis Long Bed Stay Bolt Threader, cone, leadscrew

Send us your inquiries.

COX MACHINERY COMPANY, INC.
3 MINUTES FROM THE CINCINNATI HOTEL DISTRICT
P. O. BOX 1953 CINCINNATI 1; OHIO
Office&Warehouse 311-313 Bakewell St., Covington, Ky.

1941-1952 MACHINE TOOLS

IMMEDIATE DELIVERY — NO PRIORITIES NEEDED

CAM MILLERS

VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CUTTER & TOOL GRINDERS

FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New), automatic indexing

DRILLING MACHINES

ALLEN: #2 High Speed, 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Reaming Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1⅝ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers, Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
LIDKOPING: Centerless (New)
NORTON: 10"x36" plain, hydraulic
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
BRYANT: 16C16 Hole, Hydraulic
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—SURFACE

ARTER: A-1—8" Rotary
HEALD: 8" Rotary
HEALD: No. 22 Rotary—12" Chuck
THOMPSON: Surface Grinder, Hydraulic 24"x48" (New 1952)

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"

HONING MACHINES

BARNES: No. 306H Vertical 24" Stroke
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical
NORTON: 2Fx40" dia., for flat work

LATHES—PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
Reinecker Relieving Lathe (new)
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LE BLOND: Regal, 15" swing x 42" centers
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers
PROGRESS: Geared head 16" to 30" swing (New)
TRIPLEX: 14" dia. x 40" centers Toolroom Lathes (new)
VDF New Engine Lathe 49" swing x 20' centers
VDF New Engine Lathe 27" swing x 23' centers

LATHES—TURRET

WARNER & SWASEY 2A Turret Lathe
WARNER & SWASEY #3 Turret Lathe
HERBERT: #2, #4, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

CINCINNATI: 2-spindle Vertical Hydrotel with two rotary tables of 36" dia.
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

PRESSES

Gen. FLEX: Screw Press, 3 ton

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

SHAPERS

HERCULES: 16" & 22" Shapers (New)
KLOPP: 16" to 26⅛" Shapers (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: 40A Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ⅛" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former.
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

CUT-OFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
PRESS: Screw. Gen. Flex. 3 ton
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
PUNCH SHAPERS: Sentinel Shrewbury, Thiel type design (New)
SHAPERS: Klopp 16 to 26⅛" (New)
SHAPERS: Hercules 16" & 22" (New)
GRINDER: WICKMAN Optical Profile Form Grinder (New)
WIRE FORMING MACHINES: 4-slides (new)

INSPECTION INVITED — Telephone HAnover 2-4520

TRIPLEX MACHINE TOOL CORP.

75A West Street, New York 6, New York **Cable Address TRIMACTOOL**

MACHINE TOOL ENGINEERS SINCE 1919

HARVEY GOLDMAN PRESENTS

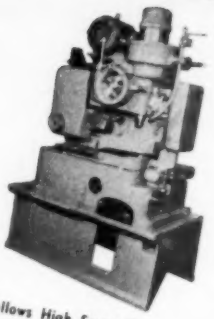
This Trade Mark Stands For:

- THE FINEST MACHINE TOOLS
- 3 GENERATIONS OF EXPERIENCE
- GUARANTEED SATISFACTION

CONSULT US WHEN YOU WANT THE BEST!

- AUTOMATICS
- BROACHES
- DRILLS
- GRINDERS
- LATHES
- MILLS
- PLANERS
- PRESSES
- SHAPERS
- MISCELLANEOUS

FOR IMMEDIATE DELIVERY



Type #7 Fellows High Speed Gear Shaper suitable for both spur and helical internal and external gears.

Reconditioned, fully guaranteed.

Available for immediate delivery.

HARVEY GOLDMAN & CO.

3910 SCHAEFER HIGHWAY • DEARBORN, MICHIGAN

TELEPHONE: TIFFANY 6-4450

THE FOCAL POINT FOR PRODUCTION MACHINERY

LATE MODEL MACHINE TOOLS . .

AUTOMATIC SCREW MACHINES

No. RA-6 9/16" Acme Gridley, 1942
No. RA-4 1¼" Acme Gridley, 1943
2" Model A Cleveland, 1942
1 1/16" Model "A" Cleveland, 1943

DRILLS, RADIAL

3'0" Cincinnati Bickford, 1942
3'11" Archdale Radial (English), 1947

GEAR EQUIPMENT

No. 7 Gleason "Hoyes" Roughet, 1943
No. 0 Gleason Revacycle Generator, 1940
No. 72 Fellows H.S. Gear Shaper, 1942
10" Pratt & Whitney Hyd. Gear Grinder, 1942
Red Ring Universal Gear Checker, 1942
20M Fellows Rod Liner Gear Tester, 1942

GRINDERS, CYLINDRICAL

16"x72" Norton Plain Type "C", 1941
16-20x36" Norton Plain Type "C", 1942
14"x108" Norton Plain Type "C", 1942
12"x60" Fitchburg Plain Hyd. 1942
10"x18" Landis Plain Type "C", 1940

GRINDERS, INTERNAL

No. 72A3 Heald Plain Hydraulic, 1942
No. 24-36 Bryant Hydraulic, 1943
No. 10 CP 10 Bryant Hydraulic, 1942
No. 10-16 Bryant Hydraulic, 1942
No. 122 Heald Hydraulic, Gap, 1930

GRINDERS, RADIUS

No. 73 Van Norman Radius Grinder, 1942

GRINDERS, SURFACE

No. 22 Heald Rotary 22" chuck, 1944

GRINDERS, THREAD

No. 39A Excello Internal Thread Grinder, 1943
No. 51 Excello Precision Thread Grinder, 1942

GUN BARREL MACHINES

No. 1½Bx50 Pratt & Whitney Rifler, 1942
No. 1½Bx50 Pratt & Whitney Reamer, 1942
No. 1½Bx30 Pratt & Whitney Reamer, 1942

LATHES, ENGINES

36"x296" American Geared Head, M.D.
27"x192" Niles "Timesaver" Lathe, 1941
27"x90" Niles "Timesaver" Lathe, 1940
26"x180" Betts Bridgeford Lathe, 1940
26"x90" Betts Bridgeford Lathe, 1940
25"x120" Lodge & Shipley Gap Lathe, 1940
25"x120" Oldfield Schofield, New
14"x30" Bradford, 1942

LATHES, PRODUCTION

No. 3FU Foster Fastermatic Platen Type, 1942
No. 5D Potter & Johnston Automatic, 1943
No. 4D Potter & Johnston Automatic, 1942
8"x84" Lo-Swing Semi-Auto, 1941
Lipe-Carbo-Matic Lathe, 1942

LATHES, TURRET

No. 1L Gisholt Universal Saddle Type, 1942
No. 3R Gisholt Universal Saddle Type, 1943
No. 4R Gisholt Universal Saddle Type, 1943
No. M5 Libby Universal Saddle Type, 1938
No. 5W Acme Universal Way Type, 1942
No. 5 Gisholt Universal Ram Type, 1942
No. 3 Gisholt Universal Ram Type, 1942
No. 4R Libby Universal Ram Type, 1942
No. 6R Denver Universal Ram Type, 1942
No. 3R Libby Universal Ram Type, 1942

MILLS, TOOL ROOM

No. 3 Van Norman Plain, 1942
No. 2 Cincinnati Vertical, 1942
No. 2K Milwaukee Plain, 1941
No. 4B Milwaukee Plain, M.D.
No. 3 Cincinnati Vertical, M.D.
No. 2G Kempsmith Universal, 1947
ALS Alcera Plain Mill (No. 2 Size), New
No. 2 Rapid Universal Mill, New
FPN 2B Mathey Vertical Mill, New

MISCELLANEOUS

2000 HP Midwest Dynamometer, 1942
75 HP Gardner Denver Air Compressor, 1945

PLANERS AND SHAPERS

52"x36"x40' Cincinnati Planer,
20" Ariston Shaper, New
24" Invicta Shaper, New
21" Ariston Shaper, New
18" Invicta Shaper, New

PRESSES

650 Ton Verson Double Action Eccentric, 1940

Partial Listing — Write for latest stock list

INDIANAPOLIS Machinery & Supply Co.

1961 S. Meridian St. • • Indianapolis, Indiana

MUST MOVE PROMPTLY FROM LOCAL CUSTOMER'S PLANT

BEMENT MILES 18" SLOTTER with 3" dia. spindle. M.D.

GOULD & EBERHARD 36" Gear Cutter M.D.

BROWN & SHARPE #5—48" Gear Cutter, M.D.

BINSEE MACHINERY COMPANY HORIZONTAL BORING MILL. Table 30"x64". Quantity of boring bars.

CINCINNATI 60"x48"x14' Planer. 4 heads. 1 extra side head on massive floor stand for open side work. M.D.

B & O #2 Turret Lathe 1" Cap. M.D.

FOOTE-BURT #25—24" Heavy duty Vert. Drill #5 M.T. Motorized.

GRINDERS—CYLINDRICAL. B & S #11, 7"x 32". Plain Grinder. Table swivels. Motorized with 4 motors.

LANDIS 10"x36" Plain, M.D. Also Planer type Grinder 16"x36".

"BEMENT" 26" STROKE TRAVERSING HEAD SHAPER. 48" travel to ram. 2 tables. (PLANER SHAPER)

WE HAVE A LARGE STOCK FROM WHICH TO SELECT. TELL US WHAT YOU WANT.

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88 Columbus 16, Ohio

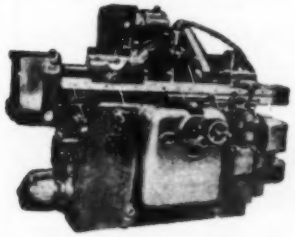
NEW and LATEST TYPE REBUILT MACHINE TOOLS FOR SALE or LEASE

LAPPING MACHINES

ULTRALAP Model 10 Vert. Lapper

LATHES

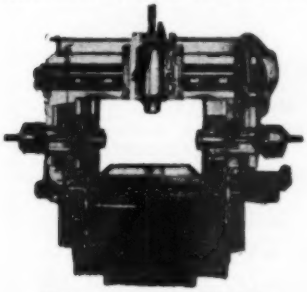
SOUTH BEND 10"x24" Q.C.G. Engine Lathe 1" Cap.
MONARCH Model EE 10"x20" Toolroom
NEW LOGAN 11"x36" CC 1" Cap.
MONARCH Model N G.H. Engine Lathe 33½"x120" cc
LODGE & SHIPLEY G.H. Engine Lathe 24"-27"x16' cc
AMERICAN G.H. Engine Lathe 24"-27"x96" cc
AXELSON G.H. 24-Sp. Engine Lathe 16"x34" cc
LEHMANN G.H. 16-Sp. Engine Lathe 18"-20"x82" cc
AMERICAN G.H. Engine Lathe 18"-18½"x36" cc
MONARCH Model ST Multi-Tool Mfg. Lathe 12"x18" cc
HARDINGE 2nd Operation Lathe 1" Cap.
CARROLL-JAMIESON 16"x8' G.H. 12-Speed Lathe



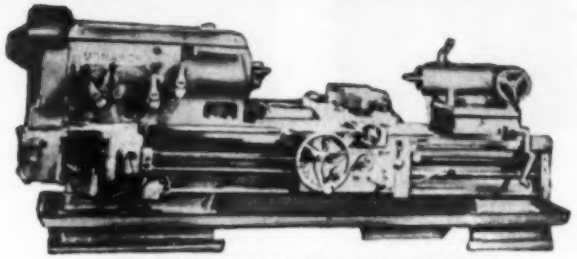
JONES & LAMSON MODEL TG 12 x 45"
AUTOMATIC THREAD GRINDER

TURRET LATHES

WARNER & SWASEY Mod. 2 G.H. Ram Type 1" Cap.
WARNER & SWASEY Mod 2 G.H. Ram Type 1½" Cap.
BARDONS & OLIVER Mod 2 G.H. Ram Type 1" Cap.
BARDONS & OLIVER Mod 3 G.H. Ram Type 1½" Cap.
WARNER & SWASEY Mod 3 G.H. Ram Type 1½ Cap.
GISHOLT Mod 3 G.H. Ram Type 1½" Cap.
LIBBY Mod 4R G.H. Ram Type 2" Cap.
BARDONS & OLIVER Mod 5 G.H. Ram Type 2" Cap.
WARNER & SWASEY Mod 5 G.H. Ram Type 2½" Cap.
GISHOLT Mod 5 G.H. Ram Type 2½" Cap.
FOSTER Mod 1B Univ. G.H. Saddle Type 2-9 1/16" Cap.



P&W 40" VERTICAL MILLER AND
PROFILER—WITH TWO SIDE HEADS



MONARCH 33½" x 120" ENGINE LATHE—MODEL N

AUTOMATICS

BROWN & SHARPE Model 00G ⅜" Cap.
CLEVELAND Model A Single Spindle 9/16" Cap.
CLEVELAND Model A Single Spindle 1-1/16" Cap.
CLEVELAND Model A 1¼" Cap.
CLEVELAND Model B Single Spindle 1½"—1⅝" Cap.

BORE-MATICS

EXCELLO Model 21-12A Single End Double Spindle Hyd. Cross Slide Table
HEALD Model 46A

DRILLS

NEW O. M. S. R. Type T.B. 2 Radial 4'x12" Column
NEW ZEWO Universal Floor Type Radial 21"x1½"
NEW CANEDY OTTO 18" Single Spindle ⅞" Cap.
NEW FAMCO 15" Bench Type Drill Presses ½" Cap.
NEW FAMCO 15" Floor Type Drill Presses ½" Cap.
MORRIS MOR-SPEED RADIAL 3'x9" Column
LELAND GIFFORD 2 Spindle

GEAR EQUIPMENT

BARBER-COLMAN Type S Gear Hobber
FELLOWS 3" Fine Pitch Shaper
GLEASON 12" Straight Bevel Generator—Finisher—Roughet
GLEASON 3" Straight Bevel Generator
GLEASON 3" Spiral Bevel Gear Generator
GLEASON 3" Bevel Gear Tester
GLEASON Model 6 Angular Hypoid Tester
GLEASON 19" Spiral Bevel Generator
BARBER-COLMAN Model 12 Hobber 12" Cap.
BARBER-COLMAN No. 3 Precision Hobber

GRINDERS

BROWN & SHARPE Model 2 Internal-External Universal Grinder 14"x30" Cap.
CINCINNATI Univ. Hydr. Cyl. Int.-Ext. Grinder 12"x36" Cap.
NORTON Model C Hydr. Plain Cyl. Grinder 6"x30" Cap.
THOMPSON Model F Hydr. Surface Grinder 6"x18" Cap.
ROTOREX Model 101-A Universal T & C Grinder, w Int. Att.
COVEL Model 01A Univ. T & C Grinder
JONES & LAMSON Model TG-12x45" Auto. Thread Grinder
EXCELLO Model 33 Thread Grinder
EXCELLO Model 31 Thread Grinder

MILLING MACHINES (Horizontal)

VAN NORMAN Model 36 Ram Type Duplex
VAN NORMAN Model 22L Ram Type Duplex
NEW CENTEC Model 2A Universal With Vert. Att.
BROWN & SHARPE Model 3B Heavy Plain
MILWAUKEE Mod 3B Plain
MILWAUKEE No. 1-B Universal Miller
SUNDSTRAND Rigidmil Bed Type Production
BROWN & SHARPE Mod 10 Auto. Production Miller
CINCINNATI Mod 00 Plain Horiz. Auto., Cycle

MILLING MACHINES (Thread)

PRATT & WHITNEY Model C-M-1884 Thread Miller 4½"x30"
HANSON & WHITNEY Univ. Semi-Auto. Thread Miller 10"x40"

MISCELLANEOUS

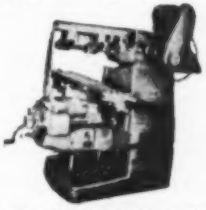
FAMCO #6, 8, 10, 12, 15 Foot Presses (NEW)
EXCELSIOR #6, 8, 10, 12, 15 Foot Presses (NEW)
ARBOR PRESSES (NEW)

VERTICAL MILLERS AND JIG BORERS

KNIGHT Model 3B Univ. Vert. Miller
MILWAUKEE Model 3 Vertical Miller
BROWN & SHARPE Model 2 Vertical Light Type Miller
GORTON Model 8D Super Speed Vertical Miller
CLEVELAND Model 1 Vertical Miller

PRESSES

WIEDEMANN Model R11P 18 Sta. Power Turret Punch
RUESCH #2 Percussion Press



NO. 36 VAN NORMAN MILLING MACHINES

PROFILERS

PRATT & WHITNEY 40-Inch Profiler 2 Side Heads
PRATT & WHITNEY 30" Single Spindle

SAWS

PEERLESS Universal Hack Saw 8"x8"
NEW FAMCO Model 612 Horiz. Band Saws 6"x12"

SHAPERS

HENDEY Universal H.S. Crank Shaper 12"
GOULD & EBERHARDT Industrial Shaper 20"

SHEARS

COLUMBIA 92"x¼" Cap. 18" Gap Power Shear

TAPPING MACHINES

BAKEWELL Model 2 Tapper ⅜"—2½" Cap.

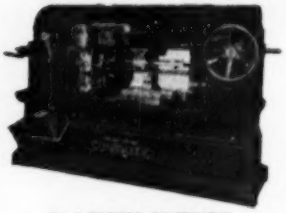
MACHINERY RENTALS, INC.

197-199 MOTT STREET NEW YORK 12, N.Y.
PHONE: WORTH 4-7615

RELIABILITY has been earned by WIGGLESWORTH MACHINE TOOLS

AUTOMATICS

2⅛" Cone, 4 spdle., well equipped, 1936
4⅛" Cone, 4 spdle., bar, late, excellent
#24 New Britain 4 spdle. chucker, 2½" cap.
¼" Model F Gridley, 4 spdle.
1½" Billings & Spencer Dimatic Cutoff
#4 Brown & Sharp single spindle 2⅛", late



3" 4 SPINDLE CONEMATIC

BORING MILLS

42" Bullard New Era, side and rail head
60" Bullard, 2 rail heads, all p.f.
4½" NBP, 33x66" table, 92" bed length

GRINDERS

#33 Excello ext. groove, late type
#84-30" Gardner vert. disc grinder
10x18" Landis type CH plain cylindrical
14x36" Norton C semi-auto., cyl.
73 Heald Internal Centerless
73 Heald Internal, 1944, like new
#76RA Rogers knife grinder, 76"
P & W deep hole drill grinder, late
Oliver single point tool
Model 1311 P & W contour, late
#106 Rivett Internal
5 HP Marschke, single end

DRILLS

6'17" Carlton radial, DC motor, late
4'11" Western radial, enclosed head
#12 Minster Jr., #5 M.T., box column
#2LMS Leland-Gifford, 26", hydraulic
#24 Footburt, 3 spdle., #5 M.T., 24"
#2 Allen, 2, 4, 6 spdle., #2 M.T.
36" Syndor single, #3 M.T.
#2 Detroit Semi-automatic, horiz.
Type 14 Natco 12 spindle
Model 4230 Bodine Drill & Tapper, 12 sta.
Moline Hole Hog, 2 spindle

GEAR MACHINERY

#13LS Fellows lapper
7A Fellows, shaper, high speed, hvy dty
61A Fellows, shaper, high speed precision

LATHES & TURRETS

30"x10' American geared head, taper att.
33" Niles vertical wheel, 1930
48" Niles vertical wheel, side and vert. head
#3 Gisholt Universal, bar feed, late
#3 Morey Universal, air chuck, late
#1A W&S Univ., serial 260313
#2 Simmons Microspeed
#4 W&S, serial 327317
Hepburn Shell
Gisholt Simplimatic, platen type
40"x35' centers LeBlond Heavy Duty, geared head, 1940.

SHAPERS & PLANERS

30"x30"x17' Cleve. Openside
48x48x14' Detrick & Harvey dble. hsg.
26" Smith & Mills shaper, 4 step cone
84"x04"x24' Gray, double housing, late

MILLS

#1½B K & T horiz., dble. overarm, rebuilt
#3 B & S vertical, geared head
#3 Sundstrand Rigidmill, horiz.
Briggs production, hydraulic
10C Van Norman Contour

THREADERS

#50 Excello Precision grinder, 28x68"
TG185 J & L Internal grinder, 12 x 15"
13" Automatic Machinery miller, late
Model 40 Lees Bradner mill, 6½" hole
#2 Dalzon grinder, 3" o.d. cap., late
LT636 Lees Bradner mill, 18 x 36", late
1½" Landis, 2 spdle., lead screw type

FURNACES

Whiting Converter, 2 ton cap., late
Model SP Justhe, gas, 1000° F
Lithdraw heat treat, 1200° F, late

PRESSES

#12 Zeh & Hahnemann percussion, 150 ton
#3 Koehler OBI, 18 ton, 2" stroke
#78½ Bliss straight side, 350 ton, sgle. crank
Ferracute type EG-52 embossing, 150 ton
Lucas 50 ton straightening, 24½" stroke
#57 Toledo, 150 ton, s.s., s.c.
#4 Toledo OBI, 25 ton, 2" stroke
#2½ Niagara OBI, 45 ton, 2½" stroke
100 ton Niles wheel press

MISCELLANEOUS

SAW: #18 Marvel hack, 18 x 18", late
HAMMER: 4000# Erie Steam, sgle. frame, late
KEYSEATER: #6-38 Mitts & Merrill, 4 x 36"
SPINNING RIVETER: Grant 5 spdle.
LAPPERS: 86-36" Gardner, vert. spdle.
HAMMER: 300# Bradley Upright Helve
WELDERS: Hobart and P & H Arc, 400 amp.
BULLDOZERS: #2 Ajax High Speed, 30 ton

T. R. WIGGLESWORTH MACHINERY COMPANY

1719 SUPERIOR AVENUE • • • SUPERIOR 1-8727 • • • CLEVELAND 14, OHIO

IMMEDIATE DELIVERY

AUTOMATICS

2⅝" CONOMATIC, 6 Spdl., Serial #2891 SE and 3484 SE, chip conveyor, threading spindle (2).
1⅝" RAS ACME GRIDLEY, 8 Spdl., Serial #60413, threading spindle.
1⅝" RAS ACME GRIDLEY, 6 Spdl., Serial #60452, 60444, 60603, threading spindle, chip conveyor (3).
1⅝" RAS ACME GRIDLEY, 6 Spdl., Serial #70987 and 70992, threading spindle, chip conveyor (2).
1" RAS ACME GRIDLEY, 6 Spdl., Serial #23455 and 23388, chip conveyor, threading spindle (2).
9/10" RAS ACME GRIDLEY, 6 Spdl., Serial #22965A, chip conveyor.
#078 NEW BRITAIN CHUCKER, 6 Spdl., Serial #25003, with chucks.
2⅝" MODEL F ACME GRIDLEY, 4 Spdl., Serial #7768, stock stand, reel.
1⅝" CONE, 4 Spdl., Serial #33, stock stand, reel.
#2 BROWN & SHARPE, Serial #3076, front and rear tool slides.
#00 BROWN & SHARPE, Serial #9198, front and rear tool slides.

BROACHES

AMERICAN, 8 Ton, 24" stroke, Serial #4463, Push Pull and Surface.
AMERICAN, 8 Ton, 24" stroke, Serial #2684, Push Pull and Surface.

GRINDERS

#2 CINCINNATI CENTERLESS, Serial #2M2HIK-433, with thru feed, infeed, Filmatic
#2 CINCINNATI CENTERLESS, SERIAL #B3441, with work rest.
#4 CINCINNATI CENTERLESS, Serial #3M3HIE-7, thru feed, infeed, Timken bearings.
#A1-12 ARTER ROTARY SURFACE, Serial #1500, with 12" Mag. Chuck.
MAJESTIC I.D. & O.D. Serial #1074, with Parker Spdl.
#81 HEALD SIZEMATIC, Serial #19051.
#81 HEALD SIZEMATIC GAGEMATIC, Serial #7625.

TURRET LATHES

#2G MOREY, Serial #T803, with 3 Jaw Chuck, Cross slide.
#1 WARNER & SWASEY, Serial #582000, ⅝" Capacity, Bar Feed.
#9 BARDONS & OLIVER, 3" Capacity, 3 Jaw Chuck.

MISCELLANEOUS

#2 BAKEWELL TAPPER, Serial #C-420.
TOLHURST OIL SEPARATOR, Serial #T16350, 60" Capacity.
MACKENZIE CHIP SEPARATOR, Floor model.

MANY PRESSES IN STOCK FROM 5 TO 525 TON CAPACITY

PAUL'S MACHINERY CO.

6111 VERMONT AVE. TYLER 7-6300
DETROIT 8, MICH.

NEW IN STOCK

1—Radil Drill, Rocco 4' x 12" rd. Column 2 motors, coolant, Aux. Table 18 Speeds, 45 to 1100 RPM Morse Taper #4

2—Engine Lathe, 12"x40" centers. Gap.

1—Engine Lathe, 16"x60" centers, Taper attach. Gap.

1—Bench Radial Drill, Zewo, 21"x½" Cap.

(Photos on request)

KINGS COUNTY MACHINERY EXCHANGE

408 Atlantic Ave. Brooklyn 17, N.Y.
Dept. A — TRiangle 5-5237

UNIVERSAL TOOL & CUTTER GRINDER

Vernon Late Model. Motorized Headstock. Table 28" x 5½". Swing 10". Head Swivel 360°. Table Swivel 90°. Complete with 2 motors, 3 jaw & 4 jaw chucks, Internal Grinding also Dresser Attachment. Serial 7072. Good condition. Priced to sell.

BOICE-CRANE CO.

930 Central, Toledo 6, Ohio

SOME LATE MACHINES STILL AVAILABLE

BORING MILLS

Bullard 24" V.T.L., Spiral Drive
Cleveland 2½" Bar Cap.
Giddings & Lewis No. 32, 3" cap.
King 42", 72" Vert. 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
Niles-Bement-Pond 60" Vert.
New 3" Hor. Bor. Mills

DRILLS AND RADIALS

American 6'x15" Univ.
Bausch Multi-spindle
Buffalo #2 Motor Spindle
Canedy-Otto 21" Sliding head New
Cincinnati Bickford 6'x15" cal.
Natco #12 20 spindle drill, Bausch
24" Sibley Sliding head
New Geared Box Col. Drills 24'
Foote-Burt #25 3" cap.
Leland Gifford 2 LMS 3 MS

ENGRAVERS

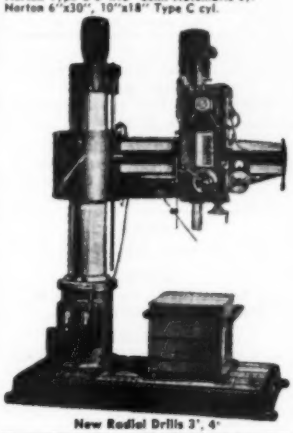
Deckel type 3 Dim., New
Gorton 3S Die Sinker
Gorton #1A, ME, Deckel GIL
Taylor-Hobson 3 dim.

GEAR EQUIPMENT

Barber-Colman #2, #12 (3), Flather 72" Cutter
Fellows High Speed Shapers 712, 725, 71
Fellows #20M Redliner
Flather 72" Cutter
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter
Michigan Gear Finisher 24" cap., 862-24-A
National Broach Red Ring Lapper
Schuchardt & Shutte #1 Hobber

GRINDERS, MISCELLANEOUS

Brown & Sharpe #2 Universal
Bryant #5, Internal, chucking, 16A16
Cincinnati 6x18" Cyl. Hyd.
Heald #73 Internal Centerless, Sizematic
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic
Landis 6"x30" Type C Cyl., 10x24 Univ.
Majestic Internal, Granby
Norton Type C 6"x18" Semi-Automatic cyl
Norton 6"x30", 10"x18" Type C cyl.



New Radial Drills 3', 4'

NEW IN STOCK

Air Hydraulic Presses — Arbor Presses #6C Famco — Band Saws Kalamazoo — Famco 6x12"—Drill Presses all sizes—Hydraulic Press Northern 20 Ton — Injection Molders, 1 ounce — Power Presses, OBI, 1, 4, 4½, 5, 7½, 10, 15, 20, 30, 55, 85 ton—Shaper 7" Amco, 8" Shaperite — Shears, Foot 22" to 8', 16 & 18 ga.—Shears, Power 3'x18 gauge to 10' x 10 ga.—Welders, Arc, Seam, Spot all sizes Motors, Grinders, Buffers.

150 Ton H.P.M. Triple Action Press 50 ton cushion, 50 ton blankholder, bed 36" x 36".

Norton 14"x96" cyl., 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver 510 Drill Pointer
Sellers 6T Tool, K.O. Lee tool
Van Norman #666 Crankshaft
Wicaco Internal

GRINDERS, SURFACE

New 8x24" Hyd. Feed, 10x18"
Abrasive 8x24", #33 Vert. & #34
Blanchard #16, 26" Mag. Chuck
G & L #35, 8"x24"
Heald 22—12" chuck, Arter 12"
Norton 6x18" Hyd., 10x36" Hydr.
Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vert
Reid 11x36 Motor in Base, 2A, 6"x18"
Tatt Pierce #1 Precision

LATHES

American 14"x30
Bridgeford 36"x20', 32"x16'
Hendey 12"x42" and 12x30", 1941, 16x66"
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed, 19x42"
Lipe-Carbo 12"x18" (2)
Late, P. & W. 16"x60
Lodge & Shipley #3A, #3 Duomatics
Sebastian 12"x4' G.H., Sheldon 12"
Wickes 32"x35' Geared Head
Reid Small Place #9WSL
Sundstrand 8x15", 15" Stub
Rivett Model 918 Precision
New 16, 18, 20", 28" Immediate Del.

MILLS, PLAIN, UNIV. PROD.

Brand New Universal Mills No. 1, No. 2
Archdale Plain, 14", Prod.
Brown & Sharpe #3B Plain, Late, 3A, 21, #2L
Cinn. No. 3, 4 Plain Spd.
Kent Owens 1V, 1-B, 1-14, 1M
Kompsmith #1 Pl.,Vert. & Div. Hd.
Milwaukee 2K, 2H Univ., 2H Plain.
Milwaukee #2B, Plain & Univ.
Simmons Micro-Mill #1A
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmill with copying Attach, 33
Van Norman #2L Univ.

AARON MACHINERY CO., Inc.

MILLS, VERTICAL

Brand New Vertical Mills
Cincinnati #3, #4 hi-power, #4 dial type
Cincinnati 0A Vertical
Morey #12M Profiler, 2 sp.
Pratt & Whitney Profiler 12B, 2 sp.
Reed Prentice 3V

PRESSES

Bliss 645, 630 Hi-Production Presses
Bliss 18, 21, OBI, 58, 62, 162, OB.
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton, 55, Bliss 74½
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
Bliss 5-48 Dbl. 32x48" bed, Cushion
Toledo 92½c Dbl. Crank 43x23" bed.
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Nursing, 15 Ton
Niagara A1½, O.B.I.
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, ☐ #3

TURRET LATHES

Acme 6W Fox 2-9/16" Cap. #2 Cross Slid Turret
Bardons & Oliver #2, 3, 5, 7
Brown & Sharpe, #2 Hand, #10, 11
Denver 6 2" Shell Turret (2)
Foster #2B 2½" Cap. Morey #2G Late
Gisholt 2L, Cross Slid. Tur. #5 Bar Feed, Chuck
Gisholt Simplimatic
Jones & Lamson #5, Bar Feed
Morey #2G Late
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1A, Timken Head
Warner & Swasey #1, 2, 3, #4 Preselector

MISCELLANEOUS

Automatic; New Britain 61 6 Sp. 1⅜" Late
Automatic, Cleveland Model B 1-1/16", A
Automatic B & S #00G 0G, 2G
Automatic 4 Sp. 1½ Conomatic
Band Saw: DoAll Zephyr 36", 16" Metalmaster
Bolt & Pipe Threader: Landis, Oster-Williams #915 Pipe & Nipple Threader
Broach: 3L LaPointe Hydro. Horiz. New Klink. 6 Ton
Hacksaw: Peerless 6"x8"
Hone: Micrematic H-4
Keyseater Davis, Baker
Oil Groover: WICACO
Shapers: 24" Rockford, 24", 28" Gould & Eberhardt, Cinn. 20, 24"
Shears Power: George Ohl 10' 3/16", 10' x 14 gauge, 11' 16 gauge
Welder: 50 KVA Taylor Air Operated, New Seam
Welder: Taylor-Winfield 50 KVA Hi-Wave

New Lathes 16" to 28", Mills, Boring Mills, Broaches, Shears & Presses

HYDRAULIC EQUIPMENT

SELF CONTAINED PRESSES

150 Ton Triple Action HPM Press
125 Ton Southwork Press, Bed 96"x30". 30" stroke, 2 to 4 ft. opening
8 and 9 oz. Injection Motors

MISCELLANEOUS PRESSES

300 Ton Watson Stillman 20"x20" Platen 8" St. 19" opening

All Hydraulic Equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your Hydraulic problems.

This is but a partial listing. Write for free Catalog. Inquiries invited. ***HUNDREDS OF OTHERS***

AARON MACHINERY CO., Inc., 45 Crosby Street, New York 12, N. Y

"CABLE—AARMACH N. Y." **Telephone WOrth 4-8233**

FINE LATE TYPE GUARANTEED TOOLS

60"x20' NILES BEMENT POND Geared Head Engine Lathe, rapid traverse

56"x18' C.M.C. Heavy Duty Lathe, 24 Speed Geared Head, power rapid traverse, 30 HP AC motor

28"x12' MONARCH Heavy Duty engine Lathe, taper attach., chucks, AC-MD

24"x72" centers Boye & Emmes heavy duty G.H. Engine Lathe, chuck, A.C., m.d.

No. 3L GISHOLT Turret Lathe, 5-9/16" hole in spindle, bar feed, chucks, tooling, new 1943

No. 2B FOSTER Geared Head Turret Lathe, rapid traverse, AC motors

54" Bullard Spiral Drive vertical Turret Lathe, Serial 23000. New 1943. Like New.

42" BULLARD Vertical Turret Lathe, New Era type, AC—MD

36" BULLARD Spiral Drive Vertical Turret Lathe, AC—MD, rebuilt

No. 3-24 Cincinnati Plain Hydromatic Mill

No. 1 DOUGLAS Plain Horizontal Mill, table 8"x32", power feeds, motor in base, Timken spindle. No. 40 taper, new 1943

#2 Van Norman Plain Mill, New 1942.

5'-13" column CARLTON Radial Drill, AC motor on arm, 15-1500 RPM, box table

4' AMERICAN High Speed Sensitive Radial Drill, 9" column, AC motor on arm

No. 6 TOLEDO O.B.I. Press, 56 Tons

25A HEALD Rotary Surface Grinder, 24" diameter, magnetic chuck

10"x24" Norton Surface Grinder, New 1943.

36" OHIO Dreadnaught Shaper, AC—MD

1½" LANDIS Bolt Threader, leadscrews, AC—MD

No. 22 Murchey Threader

75 Ton HENRY & WRIGHT Double Crank Dising Machine, roll feed & scrap cutter

No. 135 Cleveland Rigidhobbers

O'CONNELL MACHINERY CO.

Tel: BAiley 5800

1695 GENESEE ST. BUFFALO 11, N.Y.

Air Compressors, 23 to 200 cu. ft.
Header or Upsetter, 3" Ajax, M.D.
Lathe, 90" x 25' centers, Mackintosh-Hemphill.
Planer, 48" x 48" x 13' Gray, Spur Gear Drive.
Press, Trimming, No. 8 W & W, 225 ton.
Shear, Guillotine Bar, #5, 4" round.
Straightener, #3 Medart, 4½" round.

WEST PENN MACHINERY COMPANY
1210 House Bldg. Pittsburgh, Pa.

AUTOMATICS, Nos. 00G & 2G B. & S., '50
AUTOMATIC, 1¾" 4 spin. Gridley Model G
BOLT THREADERS, 1½" Williams Reliance
BOLT THREADER, 2" Landis, 2 Hds., M.D.
BORING MILL, 100" Cincl. Monitor, 2 Hds., M.D.
BORING MILL, 60" Colburn PRT, 2 Hds. M.D.
BORING MILL, 72" King, 2 Hds., P.R.T., M.D.
BORING MILL, 5" bar Betts Floor Type, with 9'x16' plate
BORING MILL, 4½" bar P. & W. #9 Floor Type
BORING MACH., 3" Bar Lucas & Lambert (2)
DRILLS, RADIAL, 4' Wooters, M.D. (2)
6' Amer. 15" col. Trip. Purp., M-on-arm
5' Amer. 15" col. Trip. Purp. M-on-arm
5' Giles #10 Rigidtine, Univ., Motor on arm
5' Amer. 14" col. Trip. Purp.
4'11" col. Cincl. Bickford
TABLES, RADIAL, 36"x20"x20"
DRILL, 28" Cincl. Bick., Tapping, M.D.
DRILL, No. 121 Baker, M.D.
DRILL, 10 Spin. Natco, C13-R
DRILLS, 21" Bayerstord Excelsior M.D. New
GEAR HOBBER, No. 00M Gould & Eberhardt
GEAR PLANERS, 11" Rivesaker Bevel
GEAR SHAPERS, Nos. 5, 04A, 04 & 01A
GEAR SHAPER, No. 75 Fellows
GEAR CUTTER, No. 13 B. & S. Spur & Bevel
GRINDER, FACE, 84" Builders, 40 h.p.
GRINDER, Micro Internal, large capty.
GRINDER, No. 73A Heald Internal
GRINDER, SURFACE 14"x36" P. & W.
GRINDER, SURFACE, 30" Blanchard No. 10
GRINDER, No. 07 Sellers Tool 1942
HAMMER 1000 lb. Chambersburg Pneumatic, 1947
KEYSEATER, No. 3½ Baker, 24" Str. 3 4" wide
LATHES, 48"x20' bed, Amer. T.A. Grd. Hd.
28, 60"x24' bed McCabe, Ohio, Spin. M.D.
24/40"x10' bed Fay & Scott Gap M.D.
32"x14' bed Shumacher Boye T.A., M.D.
24"x12' bed B. & C., T.A., Grd. Hd.
16/32"x8' Herrington Gap M.D.
18"x10' bed L. & S., T.A., Cone Motorized
18"x8' bed L. & S. Selective Grd. Hd., M.D.
16"x6' & 12"x6' Headeys (2)
14"x30" cen. Monarch T.A., 10½" sw.
14"x6' bed, Amer. T.A., M.-in-base
TURRET LA., 21" Acme Universal Brass, late
TURRET LA., 12" Libby Model A Grd. Hd.
No. 2B Foster Univ., 3½" capty., Bar Timken
No. 1B Foster Univ., 2" capty. M.D.
No. 00H Oster 1½", New
No. 3AL Gisholt, 9½", M.B.
No. 5 Gisholt, '42
No. 4A Warner & Swasey
MILLER, No. 5-48 Cincl. Hydromatic Pl. M.D.
THREAD MILLER, 12"x60" Morey Shields '42
MILLER, No. 4B B. & S. Plain M.D.
MILLER, No. 0 Sundstrand Rigidmil, Hand
MILLER, No. 1½ B. & S. T. Univ., Grd. Hd.
MILLER, No. 3 Cincl. Hi Power, Motorized
MILLER, No. 4 Cincl. Univ. Hi Power, M.D.
MILLER, No. 30M Sundstrand Rigidmil, 37" feed
MILLER, No. 2 Van Norman Ram, M.D.
MILLER, No. 22L Van Norman, Late
PIPE BENDER, 2" American, M.D.
PIPE THREADER, 2" Landis, Grd. Hd., M.D.
PRESS, 60 Ton Henry & Wright Dising
PRESS, 73½ Bliss S.B., 0" stroke
PRESS, No. 58 Toledo S.S., Grd., 171 ton capty.
PLANER, 24"x24"x5' Gray, M.D.
SHAPER, 24" Kelly, M.D., Late
SLOTTER, 22" Betts, 40" Table, M.D.

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375 Allwood Road, Clifton, N. J.
Off Route 5-3, Phone Prescott 9-8996
New York Phone: LOngacre 3-1222

72" BULLARD

10 x 18 cin. O.D. grinder, plunge cut, late.

3 spindle Avey drill, motor spindle PF and tapping.

No. 4 OBI Federal press.

Cincinnati type tool and cutter grinder—new.

No. 11R W. & S. 2 spdle. Radial Arm Tapping Machine.

SURPLUS MACHINE TOOL & EQUIPMENT CO.

ALL LATE TYPE MACHINES

Clearing 500 ton double action Press, 18"x26" stroke, 61"x71" bed area.

Clearing 100 ton single action Press, 17" stroke, 36"x36" bed area.

American 4 ft. "Hole Wizard" Radial Drill, 11" column

2 Cincinnati #2 centerless Grinders, filmatic

Heald #48A single end Baromatic, 2 heads

Pratt & Whitney 4½x36 thread Miller

Sundstrand #1 vertical hydraulic production Miller

2 J & L #7D saddle type Turret Lathes

J & L #8D saddle type Turret Lathe

Barber Colman type A Hobbing Machine

Fellows #712 hi-speed Gear Shaper

Excello #724 Shell Turning Lathe

JOHNSON MACHINERY CO.
683 Frelinghuysen Ave., Newark 5, N. J.
Bigelow 8-2500

⇒ SCARCE MACHINE TOOLS ⇐

NILES 10' Vert. Boring Mill, 2 Heads, M.D.
INGERSOLL Planer Type Mill, 4 Heads, 36" x 24" x 20'.
CINCINNATI 36" x 36" x 16' Planer, M.D.
WOODWARD & POWELL 42" x 42" x 36' Planer, M.D.
HEALD #81 Centerless Internal Grinder
HEALD #22 Rotary Surface Grinders

National Machinery Exchange
138 Mott St. New York 13, N. Y.
"If It's Machinery, We Have It"

FOR SALE

NATIONAL BROACH 18" Internal Gear Shaver Serial No. GCI-861.

WALTER H. MEYER
MACHINERY & EQUIPMENT CO.
605 W. Washington Blvd. Chicago 6, Ill.

AUTOMATIC

1⅜"-8 Conomatic, MD., 1943.

GRINDER

#33 Excello Thread Grinders with motors, cam dresser and taper.

LATHES

Reid-Prentice 14"x30", 16-speed G.H.
Monarch 12"x30" Model CK., G. H.

MILLER—Prod.

1-18 Cincinnati 50-1500 rpm.

GALBREATH MACHINERY CO.
Empire Building, Pittsburgh, Pa.

Le Maire 7-Station Automatic Drilling & Tapping Machine with Automatic Cycle

Ser. No. SP377. Mfgd. New in April, 1949. With 54" Dia. Auto. Hydr. Index Table.

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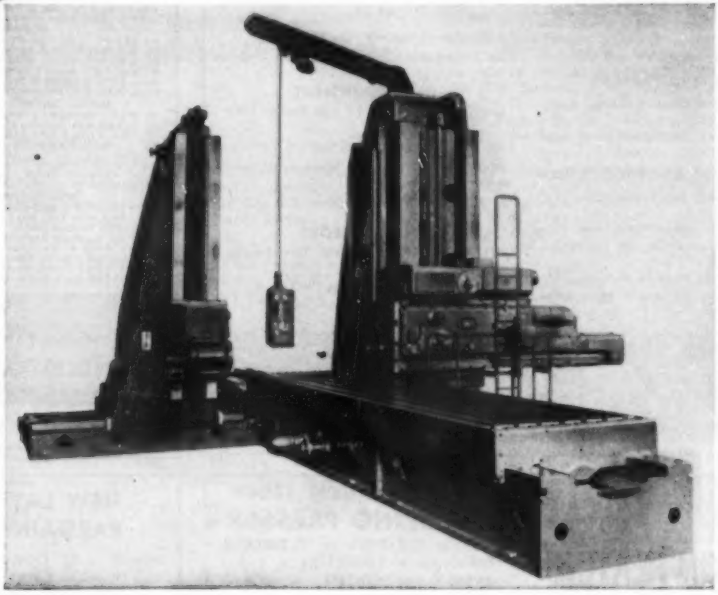

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No. 12 FELLOWS Gear Shaper, 1943
No. 360M GOULD & EBERHARDT Gear Rougher
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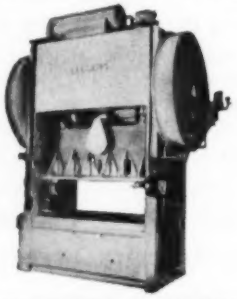

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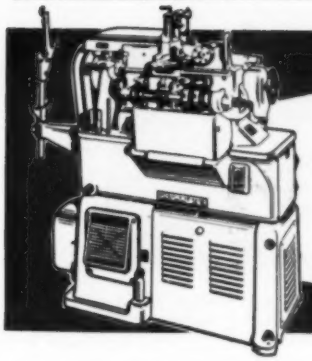

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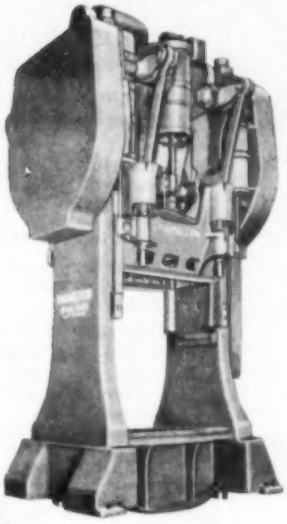

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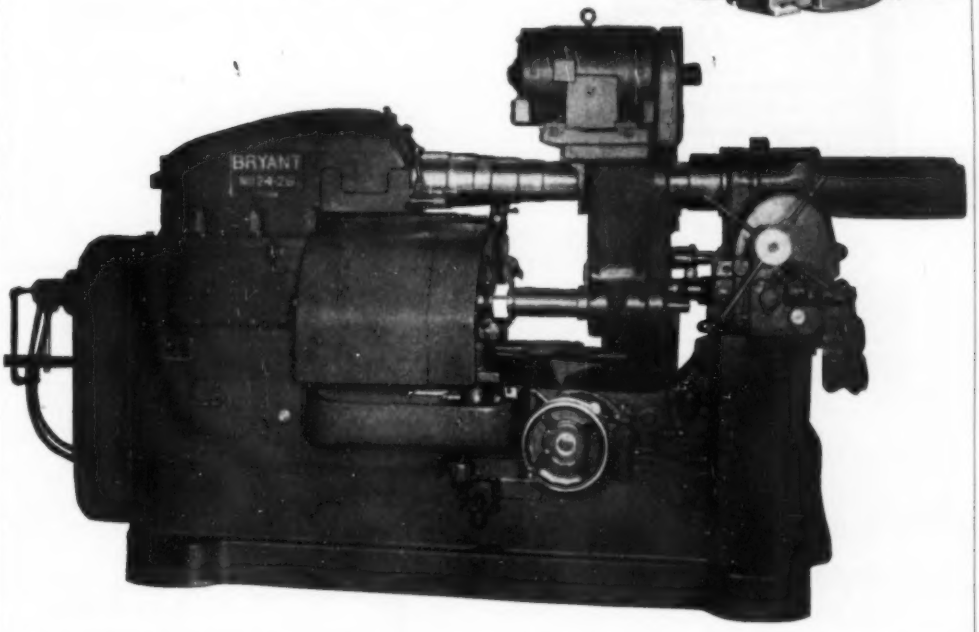

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Index of

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In This Issue

Abrasives, Coated ... 43, 74, 75, 186, 197, 211, 248

Accessories & Attachments (Machine Tool) 42, 227, 232

Balancing Machines ... 53, 54, 55, 56

Bearings ... 4th Cover, 191

Books, Technical ... 4-5, 257, 282

Boring, Drilling & Milling Machines (Horizontal) 3rd Cover, 14-15, 67, 242

Boring Machines Internal ... 2nd Cover

Boring & Turning Machines (Vertical) 14-15, 31, 169, 170

Broaching Machines ... 101, 235

Brushes ... 171, 200

Cams ... 222, 232

Castings ... 199, 257

Centering Machines ... 22-23

Centrifugal Machines ... 232

Chucks ... 226, 234, 254, 262, 283, 290

Controls, Electrical ... 60-61, 203, 204

Coolant Systems, Filters & Supplies ... 206, 213, 214, 242

Cut-Off Machines; Sawing Machines 86-87, 88, 189, 230, 259, 284

Dressers, Grinding Wheel ... 81, 261

Drilling Machines 22-23, 26-27, 32, 45, 65, 98, 102, 167, 230, 251, 256, 259

Drill Jig Bushings ... 90, 259

Duplicators & Pantographs ... 175, 283

Electro Plating & Polishing Equipment & Supplies ... 187

Exhibits ... 239

Fabricating Methods & Services ... 200

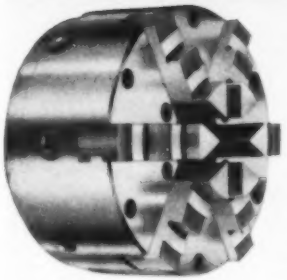
Fasteners 37, 193, 196, 215, 218, 219, 234, 254

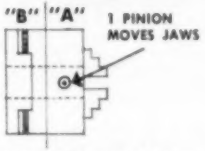
Floor Drying Compounds ... 192

Forgings ... 244

(Continued on page 284)

The UNIVERSAL Chuck with .0005 PRECISION!





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The capacity of $1,000 worth of collets for your tool room PLUS scroll chuck re-chucking speed on duplicate parts with .0005" precision . . .

The firm grip of 6 jaws for soft metal or tube work . . .

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A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads . . .

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DESPISE the political maneuver called "damnation by innuendo". The apparently innocent question, "Does Johnson beat his wife?" is just as harmful to Johnson in the long run as your positive statement that he does. Watch remarks like "Is Smith slipping?", or "Is Jones' health poor?", unless you have a malicious desire to see the thing happen.

Index of PRODUCTS ADVERTISED

In This Issue

(Continued from page 283)

Gages & Instruments 16, 36, 177, 185, 212, 231, 232, 238, 258, 260, 262

Gear Cutting Machines 3, 6-7, 146, 223, 232, 240

Gears, Speed Reducers, Motor Reducers 222, 223, 224, 225, 252

Gear Testers 3, 6-7, 240

Grinders—Cutter & Tool 12-13, 80, 214, 216, 246, 263, 285, 288, 292

Grinding Machines—Production 12-13, 18-19, 43, 62, 83, 90, 214, 226, 236, 238, 260, 263, 292

Grinding Wheels 74-75, 186, 248

Heads: Drilling, Grinding & Tapping 145, 227, 238

Heat Treating Equipment & Supplies 68, 228

Honing Machines 92, 183, 230

Hydraulic & Pneumatic Parts & Equipment 182, 221, 229

Jig Borers 232, 242

Lapping Machines 18-19

Lathes, Automatic 22-23, 49, 53, 54-55, 56, 76, 78-79

Lathes, Engine 29, 32, 41, 57, 69, 173, 175, 247

Lathes, Turret 49, 53, 54-55, 56, 78-79

Lubricants, Cutting Fluids, Quenching Oils & Solvents 58-59, 77, 150, 152, 220

Marking Machines, Tools & Supplies 207, 258

Materials, Cutting & Forming 44, 63, 82, 148, 181, 202, 217, 287

Materials of Manufacture 72-73, 179, 191, 201, 209, 233, 244, 287

Mechanical Parts & Equipment 70-71

Millers, Die Sinkers, Profilers 8-9, 20-21, 31, 33, 34-35, 195, 227, 242, 261, 291

Motors, Electrical 257

Index of

PRODUCTS ADVERTISED

In This Issue

•

Oil Purifiers 232

Planers 14-15, 94

Power Transmission 17, 30, 52

Presses, Forging & Forming Equipment & Supplies 50-51, 66, 104, 200, 205, 210, 226, 228, 230, 238, 243, 249, 253, 258

Production Inventory & Tool Control 194

Pumps, Circulating 214, 285

Riveting Machines 258

Saw Blades 28, 148, 232, 284

Screwdriving Machines 256

Screw Machines; Chucking Machines—3rd Cover 32, 64, 85, 208

Shapers, Slotters, Keyseaters 86-87, 88, 210, 238, 256

Special Machine Tools 22-23, 70-71

Stampings 230, 263

Steel Blue 226

Swaging Machines 198

Tapping Machines 78-79, 102, 230

Thread Cutting Machines 10-11

Thread Rolling Machines & Tools 64, 245

Tools, Cutting 24-25, 36, 38-39, 40, 46-47, 84, 96-97, 101, 146, 188, 190, 198, 228, 235, 237, 241, 258, 262, 289

Tools, Measuring 231

Tools, Portable 251

Transportation 48

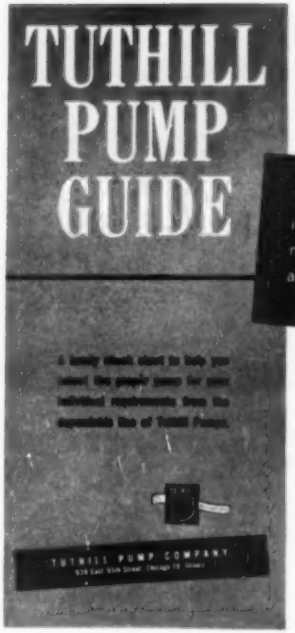
Turret Attachments, Lathe 227

Used & Surplus Equipment 265-282

Vises 36, 227

Welding & Cutting, Brazing & Soldering Equipment & Supplies 255

When You Need Pump Replacements...



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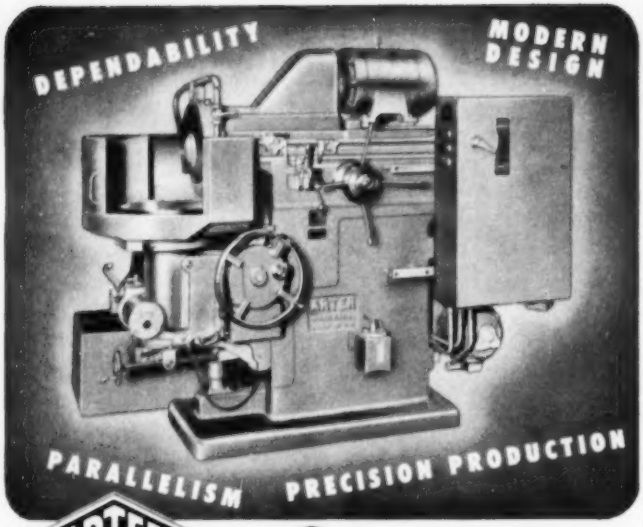

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Arter GRINDING MACHINE CO.
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DO you know just what you have in material and equipment inventories? If you don't, you'll drop more dollars than you think. It isn't necessary to know how many peanuts there are in the barrel (as one store clerk attempted to discover) but you must know how many barrels, and how rapidly one is used up.

INDEX TO ADVERTISERS

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions.

	Page
Abrasive Machine Tool Co.	226
Abrasive Products, Inc.	197
Acme Gear Co.	222
Acromark Co.	258
Air Reduction	255
Allegheny Ludlum Steel Corp.	44
Allen-Bradley Co.	203, 204
Allen Mfg. Co.	196
Allis-Chalmers Mfg. Co.	52
American Steel & Wire Division	72-73
American Steel Foundries, Elmes Engineering Division	104
American Tool Works	29
Anderson Oil Co., F. E.	152
Armour & Co., & Subsidiaries	211
Armstrong-Blum Mfg. Co.	28
Armstrong Bros. Tool Co.	42
Arter Grinding Machine Co.	286
Atlas Press Co.	253
Attapulous Clay Co. (Speedi-Dri Corp.)	192
Avey Drilling Machine Co.	98
Axelson Mfg. Co.	173
Baird Machine Co.	249
Baldwin-Lima-Hamilton Corp.	70-71
Barber-Colman Co.	38-39
Barrett Co., Leon J.	232
Bay State Abrasive Products Co.	248
Bellows Co.	184
Bethlehem Steel Co.	63
Bilgram Gear & Machine Co.	222
Black & Decker Mfg. Co.	251
Black Diamond Saw & Machine Works, Inc.	285
Black & Webster, Inc.	230
Blair Tool & Machine Corp.	222
Blake Co., Edward	246
Blanchard Machine Co.	62
Boston Gear Works	224-225
Bridgeport Machines, Inc.	227
Brown & Sharpe Mfg. Co.	33, 34-35, 36
Bryant Machinery & Engineering Co.	41
Buck Tool Co.	283

INDEX TO ADVERTISERS

	Page
Bullard Co.	169, 170
Bunting Brass & Bronze Co.	191
Carboloy—Dept. of General Electric Co.	96-97
Carborundum Co.	74-75
Carpenter Steel Co.	257
Chicago Screw Co.	254
Cincinnati Bickford Tool Co.	65
Cincinnati Gear Co.	222
Cincinnati Milling Machine Co.	4-5
Cincinnati Milling Products Div. Cincinnati Milling Machine Co.	77
Cincinnati Planer Co.	14-15
Cincinnati Shaper Co.	86-87, 88
Columbia-Geneva Steel Div.	72-73
Columbia Machinery & Engineering Corp.	189
Columbus Die Tool & Machine Co.	200
Comtor Co.	262
Cone Automatic Machine Co.	85
Consolidated Machine Tool Corp.	31
Crucible Steel Co. of America	217
Danly Machine Specialties, Inc.	50-51
Davis & Thompson Co.	259
Davis Keyseater Co.	256
Desmond Stephan Mfg. Co.	261
Dayton Rogers Mfg. Co.	263
Detroit Broach Co.	101
Detroit Power Screwdriver Co.	256
Diversified Metal Products Co.	260
Dumore Co.	216
Dykem Co.	226
Eastern Machine Screw Corp.	238
Eastman Kodak Co.	185
Eisler Engineering Co., Inc.	232
Elastic Stop Nut Corp.	37
Ellstrom Standard Div. Dearborn Gage Co.	177
Elmes Engineering Div. American Steel Foundries	104
Erickson Tools	254
Ex-Cell-O Corporation	90
Fellows Gear Shaper Co.	6-7
Ferracute Machine Co.	258
Fosdick Machine Tool Co.	45
Gairing Tool Co.	289

(Continued on page 288)

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UNITED STATES STEEL

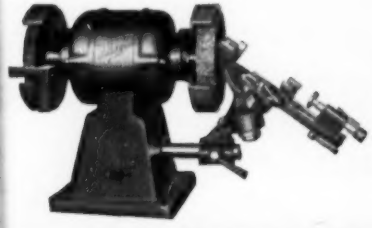
Are you having TROUBLES in your Drill Department?

Following are some of the most common and their causes.

Trouble	Cause
Oversize holes.	Unequal lip length.
Drill burns—will not cut.	Insufficient clearance.
Cutting edge chips or crumbles.	Too much clearance.
Outer corners of lip break down. Excessive wear on margins.	Speed too high.
Rough holes. Drill breakage. Drill point crushes.	Speed too slow or Feed too heavy.
Broken tangs.	Dirt or chips in socket or worn out socket.

Most of the above can be overcome by using a precision type Drill Grinder. A Hisey Drill Grinder will quickly pay for itself when you consider that drills that are correctly ground and kept sharp will (1) drill faster, (2) drill more holes per grind, (3) drill to exact size, (4) reduce breakage, (5) increase life of drill by removing less metal when sharpening.

A Hisey Drill Grinder will grind drills quickly and correctly with inexperienced operators.



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It shows more than 200 different types and sizes of Bench and Pedestal Grinders, Buffers and Polishers, Snagging Grinders, Lathe type Grinders, Wet Tool Grinders, Disc Grinders and Dust Collectors.

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

From the *American Machinist* Library of *Tips for Top Shop Men*

TAKE a man's pride in his job away, and there isn't much left; he becomes another automaton. Even a trained seal enjoys the applause as much as he does the fish.

WHEN you walk the tight-rope between close tolerances, or between good and bad finish, balance is vital. Be sure you have it, in machine-tool spindle or shaft, in tooling, in fixture. It will pay out in longer tool life and reduced scrap.

INDEX TO ADVERTISERS

(Continued from page 288)

	Page
Gallmeyer & Livingston Co.	292
Gardner Machine Co.	43
Gay-Lee Co.	228
General Electric Apparatus Dept.	60-61
Giddings & Lewis Machine Tool Co.	14-15
Gisholt Machine Co.	53, 54-55, 56
Gleason Works	3
Gorham Tool Co.	84
Gorton Machine Co., George	195
Goss & de Leeuw Machine Co.	208
Grant Mfg. & Machine Co.	258
Gray Co., G. A.	94
Graymills Corp.	242
Grob Brothers	259
Hammond Machinery Builders, Inc.	214
Hanson-Van Winkle-Munning, Inc.	187
Hardinge Brothers, Inc.	57
Hartford Special Machinery Co.	245
Heald Machine Co.	2nd Cover
Henry & Wright Div., Emhart Mfg. Co.	238
Hisey-Wolf Machine Co.	288
Honan-Crane Corp.	213
Hones, Inc., Charles A.	228
Howell Electric Motors Co.	257
Illinois Tool Works	146
Investment Casting Co.	257
J & S Tool Co.	81
Jahn Manufacturing Co., B.	205
Johnson & Son, Inc., S. C.	220
Jones & Lamson Machine Co.	76, 83
Jones & Laughlin Steel Corp.	233
Kallay Gear Works	222
Kearney & Trecker Corp.	20-21
Kelvin Systems Corp.	256
Kempsmith Machine Co.	242
Kennametal, Inc.	201
King, Andrew	260
Klink, Arthur	235
Knight Machinery Co., W. B.	291
L-W Chuck Co.	262
Landis Machine Co.	10-11
Landis Tool Co.	12-13
Latrobe Electric Steel Co.	209
Leland-Gifford Co.	167
Link-Belt Co.	17, 30

INDEX TO ADVERTISERS

	Page
Linley Brothers Co.	242
Lucas Machine Division New Britain Machine Co.	67
Luers, J. Milton	232
Madison Mfg. Co.	262
Maschinenfabrik Lorenz A. G.	223
Maxwell Company	198
McCaskey Register Co.	194
McGraw-Hill Book Co., Inc.	282
Meyers Co., Inc., W. F.	259
Micromatic Hone Corp.	92
Micrometrical Mfg. Co.	212
Minster Machine Co.	243
Mitts & Merrill	238
Moline Tool Co.	230
Monarch Machine Tool Co.	69
Morey Machinery Co., Inc.	230
Morris Machine Tool Co.	102
Morse Twist Drill & Machine Co.	24-25
Mueller Brass Co.	244
Murchey Machine & Tool Co.	145
National Acme Co.	64
National Automatic Tool Co.	26-27
National Broach & Machine Co.	240
National Machine Tool Co.	210
National Malleable & Steel Castings Co.	199
National Tool Co.	241
National Twist Drill & Tool Co.	47
Nebel Machine Tool Co.	247
Nelco Tool Co.	190
New Britain Gridley Machine Co.	3rd Cover
Nilson Machine Co., A. H.	228
Norton Company	18-19
Oliver Instrument Co.	80
O'Neil-Irwin Mfg. Co.	283
Orban Co., Inc., Kurt	32, 250
Osborn Mfg. Co.	171
Ottemiller Co., Wm. H.	234
Parker-Kalon Corp.	215
Parker Stamp Works, Inc.	207
Philadelphia Gear Works	252
Pittsburgh Plate Glass Co., Brush Div.	200
Porter Cable Machine Co.	238
Potter & Johnston Co., Sub. Pratt & Witney Div., Niles-Bement-Pond Co.	49

(Continued on page 290)

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E-CON-O-MILL STANDARD FACE MILLS

OFFERED IN 3 LINES

To economize . . . *standardize on E-Con-O-Mill.* First made five years ago, these sturdy mills not only proved themselves tools of truly one-piece rigidity, but have effected important savings on these points:

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They Reduce Machine Down-Time. Blades are changed easily, may be replaced by new or re-sharpened blades without taking the cutter from the machine.

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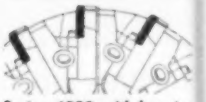
Series 2500 cone-type mills in sizes from 5 to 16-inch dia. (Eight-inch mill has 8 or 10 blades)



Series 4500 with heavier bodies in sizes from 8 to 16-inch dia. (Eight-inch mill has 10 or 12 blades)

Series 6500 cone-type mills with greater number of blades, sizes 8 to 14 inch, specially recommended for cutting cast iron. (8-inch mill has 16 blades)

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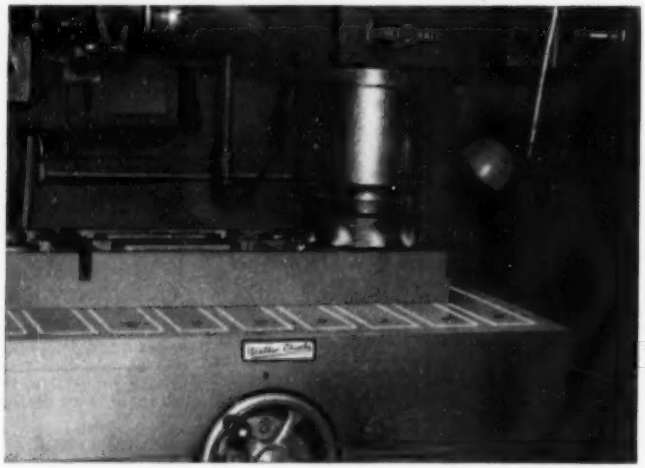
From the *American Machinist* Library of *Tips for Top Shop Men*

DON'T put a worried man on a critical job. If safety is a function of flawless timing, the man with something else on his mind is accident prone. Give him a safe job for a while, until his sorrow, illness, financial ailments, or mental scramble can straighten itself out.

IF you resent interruptions when you're busy, set the example by not interrupting others when they're busy. If you are careless with your men's privacy, you can expect them to be careless of yours.

Walker Does It Again–



Milling machine operating a carbide cutter 660 f.p.m.; table feed 25 i.p.m. on rough steel castings. Walker Magnetic Chuck, securely holding workpiece, increases production equivalent to work of four planers. Take advantage of modern Walker methods for increasing production, reducing cost.

O. S. WALKER CO. Inc.

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Original Designers and Builders of Magnetic Chucks

In Canada—Upton Bradeen & James, Ltd.

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THE common belief that "perishable tools" are written off when they go out to the machine is one of today's most expensive notions. Unless control is exercised *in use* as well as in stocking, the machine, method or man that breaks or ruins an excessive number of tools is never spotted. In one test, ratio of tool use on two machines of the same type on the same job was 1 to 7.

INDEX TO ADVERTISERS

(Continued from page 289)

	Page
Rahn Granite Surface Plate Co.	232
Railway Express, Air Express Div.	48
Revere Copper & Brass, Inc.	179
Ruthman Machinery Co.	214
Ryerson & Sons, Inc., Joseph T.	202
Schrader's Son, A.	221
Second European Machine Tool Exhibition, Hanover	239
Sheffield Corp.	145
Shore Instrument & Mfg. Co., Inc.	238
Sidney Machine Tool Co.	175
Simonds Abrasive Co.	186
Simonds Saw & Steel Co.	148
Speedi-Dri Corp.	192
Springfield Machine Tool Co.	41
Stahl Gear & Machine Co.	222
Standard Electrical Tool Co.	263
Standard Oil Co. (Indiana)	58-59
Standard Pressed Steel Co.	218-219
Standard Tool Co.	40
Sundstrand Machine Tool Co.	22-23
Sundstrand Magnetic Products Co.	234
Sunnen Products Co.	183
Sun Oil Co.	150
Super Tool Co.	237
Taco Heaters, Inc.	206
Tannewitz Works	284
Tennessee Coal & Iron Div.	72-73
Thompson Grinder Co.	236
Timken Roller Bearing Co.	4th Cover
Torrington Co.	198
Tubular Micrometer Co.	231
Tuthill Pump Co.	285
U. S. Burke Machine Tool Co.	261
United States Steel Co.	72-73, 287
United States Steel Export Co.	72-73
United States Steel Supply Div.	72-73, 287
V & O Press Co. Div., Emhart Mfg. Co.	226
Vanadium Alloys Steel Co.	181
Van Keuren Co.	16
Van Norman Co.	8-9
Vickers, Inc.	229
Vlier Mfg. Co.	193
Walker Co., Inc., O. S.	290
Waltham Machine Works	232
Warner & Swasey Co.	78-79
Weldon Tool Co.	258
Wesson Co. & Affiliates	188

INDEX TO ADVERTISERS

	Page
Westinghouse Electric Corp. Electronic & X-Ray Div.	68
Wheelock Lovejoy & Co., Inc.	82
Whiton Machine Co.	226
Wilson, K. R.	66
Wilson Mechanical Instrument Co.	258
Winter Brothers Co.	46
Wittek Manufacturing Co.	210
Zeh & Hahnemann Co.	230

SEARCHLIGHT SECTION
(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
- Positions Vacant 263, 264
- Selling Opportunities Offered 264
- Employment Agencies 264
- Employment Services 264

SPECIAL SERVICES
- Contract Work 264
- Associated Designers 264
- General Pattern Works 264
- Lafayette Grinding Corp. 264
- Sier-Bath Gear & Pump Co., Inc. 264

EQUIPMENT
- (Used or Surplus New) For Sale 265-282

WANTED
- Equipment 264

ADVERTISERS INDEX

Aaron Machinery Co.	275
Acme Machinery & Manufacturing Co.	264
Amco Machinery Co.	280
Beaver Industries	279
Bennett Machinery Co.	276
Boice-Crane Co.	274
Botwinik Bros., of Mass.	266
Brownell Machine Tools, Inc.	266
Columbus Production Mfg. Co.	282
Consolidated Products Co., Inc.	280
Cowden Machinery Co., W. C.	280
Cox Machinery Co., Inc.	270
Crown Machinery Co.	280
Currier Machine Sales	280
Di-Tru Tool & Manufacturing Co.	264
Dony Machinery Co., D. E.	280
Eastern Machinery Co.	270
Electric Equipment Co.	282
Emerman Machinery Corp.	281
Employment Counsel	264
Falk Machinery Co.	265
Foster Machinery Sales Co.	280
Galbreath Machinery Co.	276
General Steel, Inc.	282
Goldman & Co., Harvey	272
Hill-Clark Machinery Co.	269
Holtzman Machinery Co.	280
Hoy, L. J.	278
Hyman & Sons, Joseph	278
Indianapolis Machinery & Supply Co.	272
International Merit Products Corp.	277
Johnson Machinery Co.	276
Kings County Machinery Exchange	274
Lockheed Aircraft Corp.	263
Machinery Rentals, Inc.	273
MacDell Corp.	278
Meyer, Machinery & Equipment Co., Walter H.	276
Miles Machinery Co.	266
Morey Machinery Co.	267, 268
Motch & Merryweather Machinery Co.	280
National Machinery Exchange	276
New Rochelle Tool Corp.	278
O'Connell Machinery Co.	276
Osborne & Sexton Machinery Co.	272
Pamco Corporation	264
Paul's Machinery Company	274
Schneir & Company, Julius J.	276
Stone Supply Co., J. J.	282
Surplus Machine Tool & Equipment	276
Triplex Machine Tool Corp.	271
Wabash Employment Agency	264
West Penn Machinery Co.	276
Wigglesworth Industrial Corp.	278
Wigglesworth Machinery Co., T. R.	274
Williams, Edward Hale	280
Winston Machinery Co.	278

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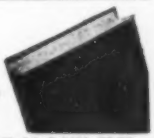

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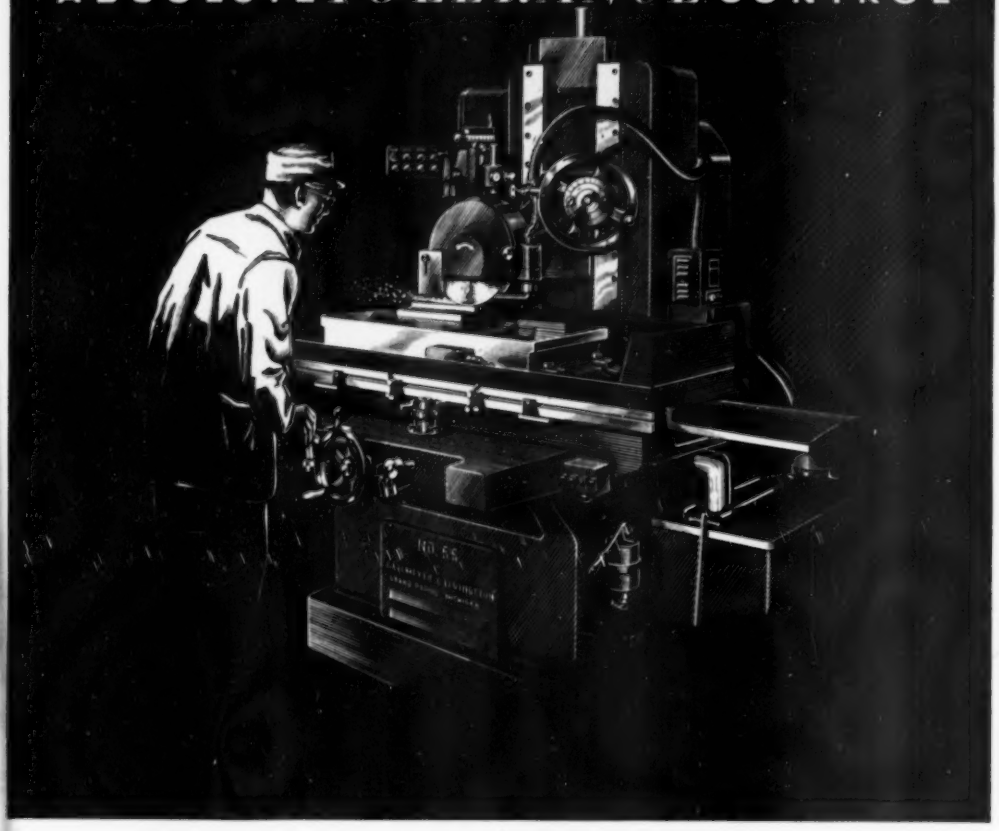

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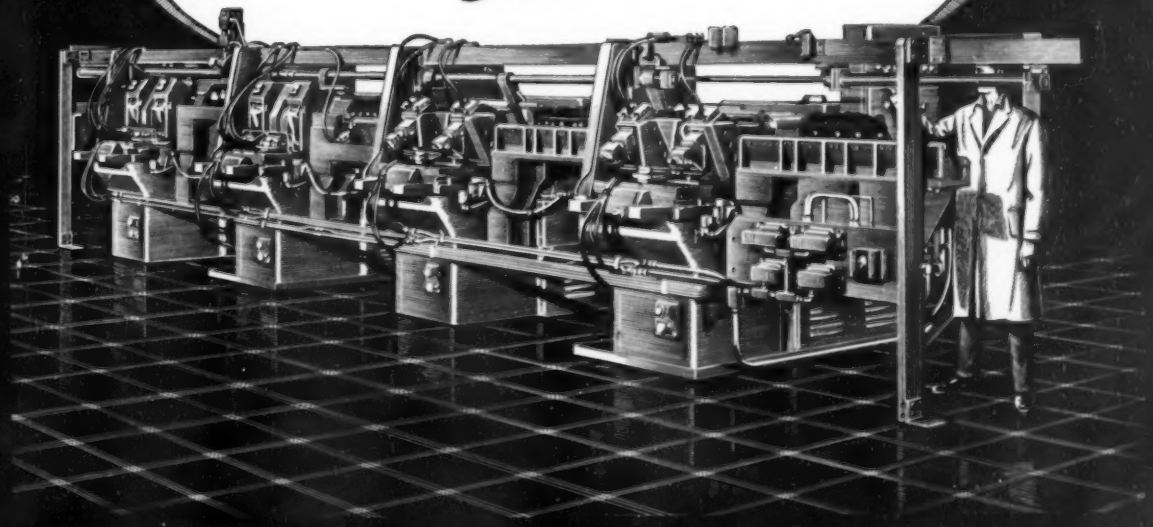

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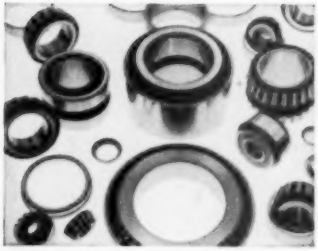
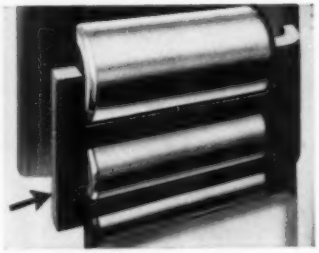
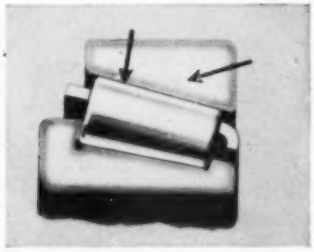


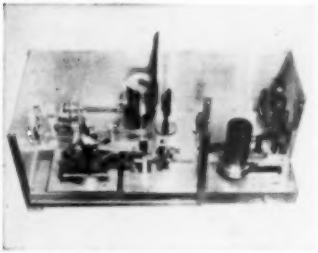
26 TYPES. Because Timken® bearings are made in 26 types, you get exactly the right tapered roller bearing for your job.



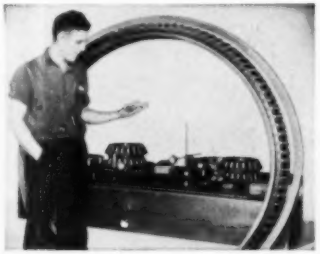
SOFT STEEL CAGE separates the rollers in Timken tapered roller bearings and prevents scuffing.



TOUGH INSIDE—HARD OUTSIDE. Case carburizing of rollers and races gives a wear-resistant surface, shock-resistant core.

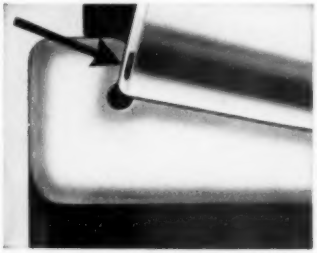


MICRO-INCH FINISH. With help of the profilograph, which measures surface irregularities to a millionth of an inch, the Timken Company has developed a bearing finish of micro-inch accuracy.

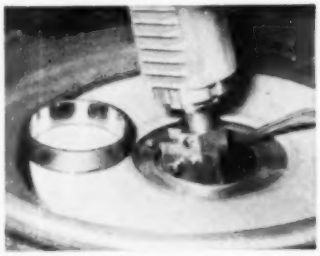


5850 SIZES. If you need a tapered roller bearing smaller around than your finger or as large as 71½" in diameter, you can get it from The Timken Roller Bearing Company.

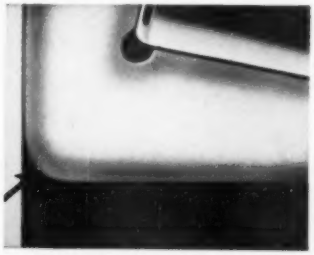
WE MAKE OUR OWN STEEL. Because Timken bearings are made of special alloy steel, produced in the Timken Company's own mills, they have extra strength and wear resistance.



RIB OF CONE maintains roller alignment, prevents skewing, assures maximum bearing capacity.



PRECISION MANUFACTURE makes possible bearings with a maximum runout tolerance of less than 75 millionths of an inch.



GENEROUS RADIUS on the inside diameter of Timken bearing cones permits greater shaft strength.

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